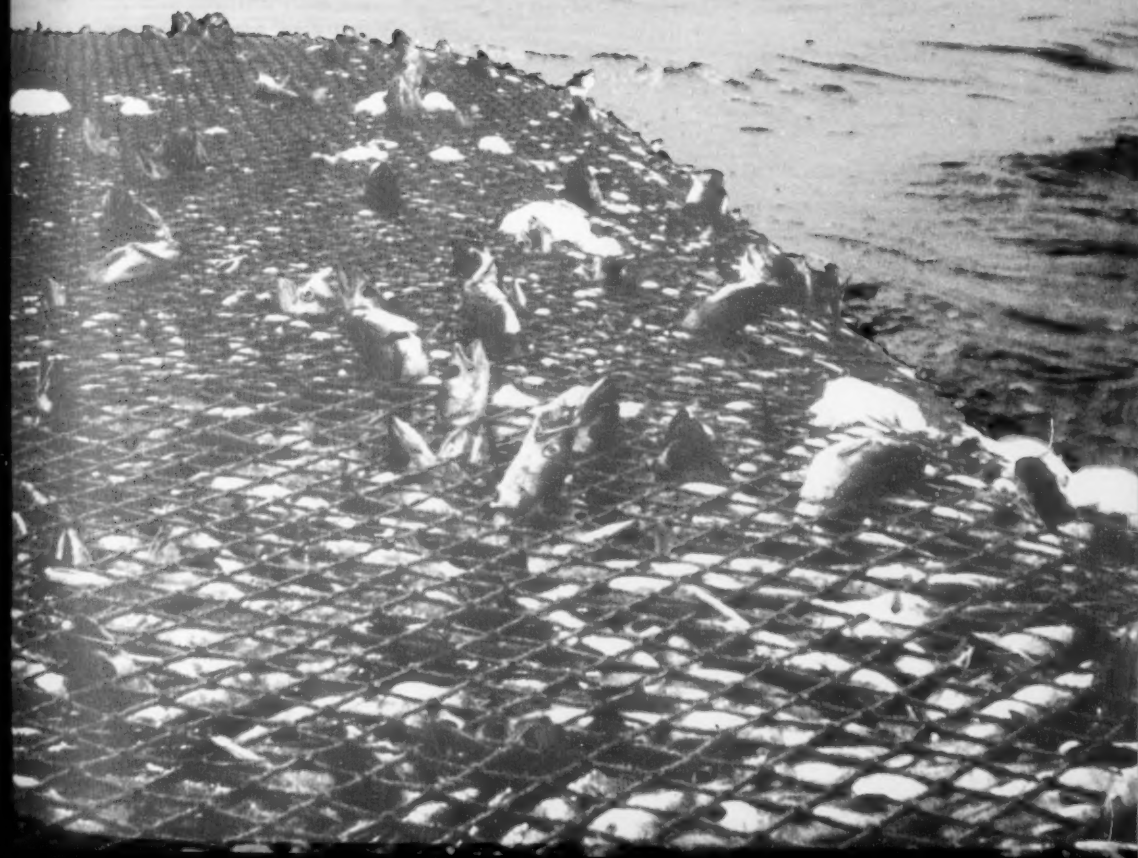


# COMMERCIAL FISHERIES *Review*

VOL. 28, NO. 11

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DIV. OF FISHERY

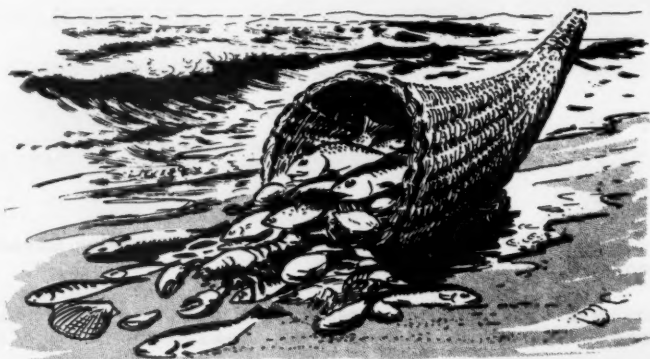


COVER: Commercial Pacific Coast trawler St. Michael retrieves a 30,000-pound catch of Pacific hake in Puget Sound. Exploratory surveys by Bureau of Commercial Fisheries (BCF) during 1962-1964 located this large unexploited resource.

# COMMERCIAL FISHERIES

## *Review*

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.



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Three mainstays of fishing industry: skilled hands and nylon net. Average age of fishermen continues to rise as too few youths choose the sea. Nylon makes possible large nets and large catches. (Photo: Rex Gary Schmidt)

## D. L. McKernan Sees Bright Future for Fishing Industry

Although its catch has been distanced by the world catch, the value of United States fishery products at both the fisherman's and consumer's level has never been higher, Donald L. McKernan said at the dedication of the new Gorton plant at Gloucester, Mass., on September 23.

On November 1, Mr. McKernan ended his 10-year directorship of the Bureau of Commercial Fisheries and assumed his new responsibilities as Special Assistant to the Secretary of State for Fish and Wildlife.

In 1965, he said, the value of the domestic catch of fishery products at the fishermen's level increased 18 percent, while the gross national product increased only 8 percent. This increase was not due to price inflation. In fact, he noted, fish prices adjusted for cost-of-living increases have not increased since 1962. Instead, the increase came from greater production of more valuable varieties of fish and new and desirable products for the kitchen.

The burgeoning populations of both the affluent and impoverished nations, greater harvests from the sea, and a stream of new fishery products will stimulate and insure the growth of the fishing industries of this nation and the world, Mr. McKernan said.

What about the demand for fishery products in the years ahead? Mr. McKernan referred to a BCF study based on a modest population growth in the United States, disposable income in the future, and expected per-capita consumption of fish. During 1964, the study showed, the United States, with a population of 192 million, was consuming 12 billion pounds of fish in all forms. A population projection to 1970 shows 209 million people; to the year 2000, 340 million. The use of fishery products, domestic and imported, will most likely be about 15 billion pounds in 1970 and 28 billion in 2000--2½ times the 1964 use. And, Mr. McKernan added, if the fishing industry develops more high-quality, convenient, and economical products, the yearly requirements in 2000 may be 38 billion pounds in the United States alone.

### Greater Harvests and Industrial Wizardry

He said that most experts predict the multiplication of the world fish catch. He himself predicted that if the United States harvested efficiently the available living resources of the sea and learned to improve the farming of the sea's edge (aquaculture), the sea could easily produce at least 5 times, and maybe more, its present harvest. The sea could be a powerful force in alleviating food deficiency throughout the world.

Not only are fish abundant, he said, but it is practical to develop products that will increase their acceptability to the world's population. "Industrial wizardry" has only scratched the surface. For those who want fresh fish in the skin, this "wizardry" promises to preserve the delicate flavor and textures much longer than now possible--by irradiation, freeze drying, and by chemical freezing using liquid nitrogen and other chemicals.

The first fish protein concentrate has been produced in a variety of colors, tastes, and forms (from a coarse dried cake or colorless powder to a colorful and pungent sauce). All these concentrates, he asserted, are exceptionally nutritious, well preserved, and economical.

### The Many Attributes of Fish

Mr. McKernan said that Americans are the most nutrition-conscious people in the world and that fish and shellfish are essential requirements for a well-planned family diet. These foods are suitable for all age-groups--but uniquely suited to the very young and old, the most rapidly increasing segments of the population. They are excellent additions to the diets of people suffering from dietary deficiency diseases. And eminent medical authorities recommend increased use of fish to lower high blood-cholesterol levels.

He said he was not urging people to eat fish and shellfish only because of these nutritional and health values. These foods have more to recommend them: "convenience,

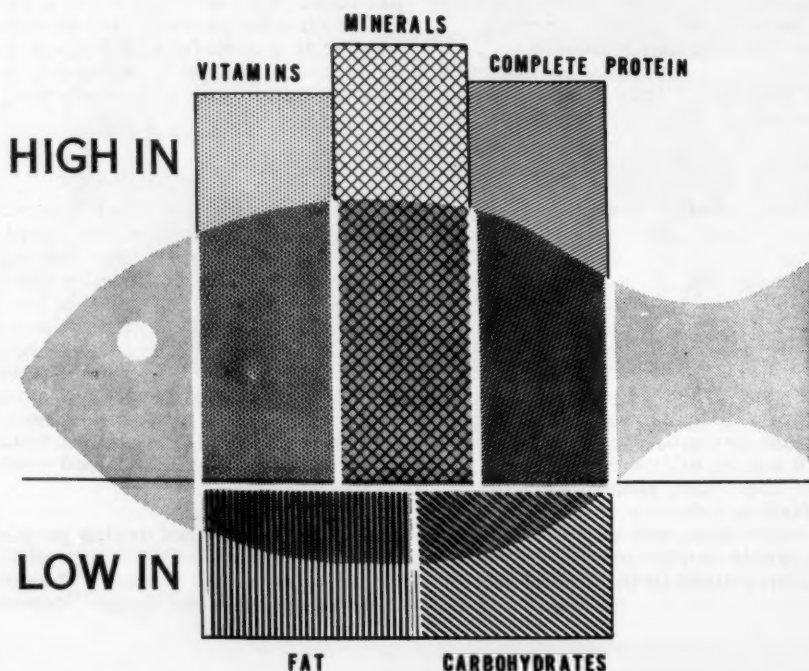
economy, variety, quality and, above all, fish and shellfish are just plain good eating."

Mr. McKernan pointed to studies showing growing demand in the United States and increasing world awareness of the great potential of the sea to produce food for "tomor-

row's children." "To me," he concluded, "the future looks bright for this industry, and I cannot help but predict that our children and their children will enjoy life and be healthier partly because of a plentiful supply of food from the sea."



## The BENEFITS of FISH



# UNITED STATES

## EVENTS AND TRENDS

### Industrial Fishery Products

#### IMPORTS SUSTAIN FISH MEAL AND SOLUBLES SUPPLY

Based on domestic production and imports, the available supply of fish meal in the United States for the first 8 months of 1966 was 435,953 short tons--1,327 tons (or 0.3 percent) less than the same period in 1965. Domestic production was 53,713 tons (or 28.7 percent) lower--but imports were 60,222 tons (or 24.8 percent) higher than in January-August 1965. Peru continued to lead with shipments of 186,903 tons.

duction of fish solubles decreased 17.1 percent, but imports of fish solubles increased 3.5 percent.

\*\*\*\*\*

#### FISH MEAL AND SOLUBLES PRODUCTION DOWN, OIL UP

During August 1966, 21 million pounds of marine animal oils and 28,084 tons of fish meal were produced. Compared with August 1965, this was a decrease of about 16.0 million pounds of oils and 13,991 tons of fish meal and scrap. Fish solubles production was 12,207 tons--a decrease of 5,783 tons from August 1965.

U.S. Supply of Fish Meal and Solubles, January-August 1966

Item	Jan.-Aug.		Total 1965
	1966	1965	
. . . (Short Tons) . . .			
<b>Fish Meal and Scrap:</b>			
<b>Domestic production:</b>			
Groundfish . . . . .	7,368	8,591	10,696
Herring . . . . .	7,747	10,049	12,932
Menhaden 1/ . . . . .	90,059	139,321	175,959
Tuna and mackerel . . . . .	20,595	16,388	25,399
Unclassified . . . . .	7,555	12,688	17,360
Total production 2/. . . . .	133,324	187,037	242,346
<b>Imports:</b>			
Canada . . . . .	31,729	28,987	43,830
Peru . . . . .	186,903	201,358	209,801
Chile . . . . .	61,951	5,128	5,651
Norway . . . . .	8,593	49	78
So. Africa Rep. . . . .	6,040	2,900	5,100
Other countries . . . . .	7,413	3,985	6,206
Total imports . . . . .	302,629	242,407	270,666
Available fish meal supply . . . . .	435,953	437,280	524,717
<b>Fish Solubles 3/:</b>			
<b>Domestic production . . . . .</b>	<b>59,780</b>	<b>72,133</b>	<b>94,839</b>
<b>Imports:</b>			
Canada . . . . .	1,064	1,095	1,488
Mexico . . . . .	279	152	227
Peru . . . . .	1,941	1,504	2,598
Other countries . . . . .	360	770	825
Total imports . . . . .	3,644	3,521	5,138
Available fish solubles supply . . . . .	63,424	75,654	99,977

1/Includes other species.

2/Does not include small quantity of shellfish and marine animal meal and scrap because production data are not available monthly.

3/Wet-weight basis except for imports from South Africa Republic (included in "other countries").

Source: BCF and U. S. Department of Commerce, Bureau of Census.

U. S. Production of Fish Meal, Oil, and Solubles, August 1966 1/ with Comparisons

Product	Aug.		Jan.-Aug.		Total 1965
	1/1966	1965	1/1966	1965	
. . . . . (Short Tons). . . . .					
<b>Fish Meal and Scrap:</b>					
Groundfish . . . . .	1,014	1,180	7,368	8,591	10,696
Herring . . . . .	2,870	3,318	7,747	10,049	12,932
Menhaden 2/ . . . . .	19,516	33,391	90,059	139,321	175,959
Tuna and mackerel . . . . .	3,056	2,573	20,595	16,388	25,399
Unclassified . . . . .	1,628	1,613	7,555	12,688	17,360
Total 3/ . . . . .	28,084	42,075	133,324	187,037	242,346
<b>Fish Solubles:</b>					
Menhaden 2/ . . . . .	9,514	15,488	43,153	57,501	73,181
Unclassified . . . . .	2,693	2,502	16,627	14,632	21,658
Total . . . . .	12,207	17,990	59,780	72,133	94,839
. . . . . (1,000 Pounds). . . . .					
<b>Oil, body:</b>					
Groundfish . . . . .	133	273	1,193	1,962	2,441
Herring . . . . .	2,009	1,850	5,341	6,902	8,543
Menhaden 2/ . . . . .	17,713	34,503	98,147	142,463	175,202
Tuna and mackerel . . . . .	703	634	3,240	2,798	4,793
Unclassified (inc. whale) . . . . .	1,205	503	3,801	2,449	4,521
Total oil . . . . .	21,763	37,763	111,722	156,574	195,500

1/Preliminary data.

2/Includes small quantity of other species.

3/Does not include small quantity of shellfish and marine animal meal and scrap because production data are not available monthly.

Source: U. S. Department of the Interior, Bureau of Commercial Fisheries.



The United States supply of fish solubles during January-August 1966 amounted to 63,424 tons--a decrease of 16.2 percent compared with same 1965 period. Domestic pro-



## Slight Rise in Can Shipments for Fishery Products, January-July 1966

In January-July, 1,800,821 base boxes of steel and aluminum were used to make cans shipped to fish and shellfish canning plants. This compares with 1,756,091 base boxes used during the same period in 1965.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area of 31,360 square inches, equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans are derived by using factor 23.7 base boxes per short ton of steel.

Source: U. S. Department of Commerce, Bureau of the Census.



## Canned Fish Purchases Planned by Defense Supply Agency

A list of planned procurements of canned meat, poultry, and fishery products for fiscal 1967 (July 1, 1966-June 30, 1967) was published recently by the Defense Supply Agency, Defense Personnel Support Center (DPSC), Philadelphia, Pa. The fishery products included canned salmon and tuna.



According to the forecast, DPSC will purchase 3,889,200 cans of red or sockeye salmon (No. 1 tall cans) during fiscal 1967. Anticipated purchases of canned tuna are: 5,090,400 cans (12.5/13-oz.) and 5,560,800 cans (6.5/7-oz.).



## Inventions

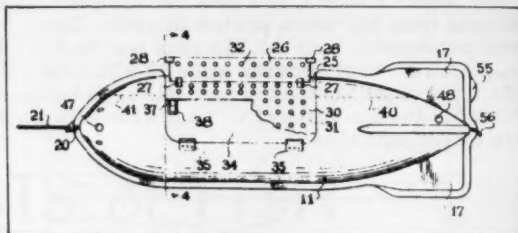
### METHOD FOR RAISING BASS AND FROGS PATENTED

Recently patented was a new method of fertilizing pond water with organic matter to increase diatoms and bacteria--and induce growth of daphnia and midges--so that 5 to 50 times more fish may be produced per acre per year than by any other method. (U. S. Patent No. 3,158,135 issued Howard J. Kimmerle, 5602 Long Beach Blvd., Long Beach, Calif.)

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## SUBMERGIBLE FLOATING BAIT TANK PATENTED

A submergible floating bait tank provides small-boat fishermen better means of keeping live bait. The inventor claims the main advantages of this tank over existing designs are that it can be towed faster than 20 knots to the fishing grounds. It travels submerged below surface turbulence, protecting and revitalizing the bait, and it floats handily near the gunwale during fishing. It is a streamlined shell of plastic with foam flotation



Submergible floating bait tank.

blocks. Perforations provide proper water circulation, certain perforations being covered by panels during speed runs. It is said to be easy and cheap to make. (U. S. Patent No. 3,036,400 issued William B. Anderson, 2089 Orange Ave., Costa Mesa, Calif.)



## Transportation

### SEC. UDALL SUPPORTS RAILWAY EXPRESS PETITION TO ICC TO REMOVE RULE

The Railway Express Agency (REA) has petitioned the Interstate Commerce Commission (ICC) to remove a rail-haul restriction from its many motor carrier certificates. These ICC certificates authorize REA to operate trucks over the highways beyond delivery limits--but they specify that these shipments must be immediately preceded or followed by rail removal.

Since 1940, there has been a reduction of passenger train service of the railroads that handle express traffic. As a result, REA has had to obtain motor carrier operating authority in order to continue nationwide service. Passenger train service today is such that

REA cannot give complete nationwide service if part of the move must be by rail.

Interior Secretary Stewart L. Udall supports the REA petition because the agency is the only nationwide carrier handling fresh fish packed in ice. It is also the only carrier providing re-icing service en route.

The petition is opposed by motor carriers and the American Trucking Associations, which fear traffic loss.



## 1965 Great Lakes Commercial Fishery

U. S. and Canadian commercial fishermen caught about 98.6 million pounds of fish in the Great Lakes in 1965, according to BCF and Ontario Department of Lands and Forests. Landings in 8 Great Lakes states totaled 54.1 million pounds, or 600,000 pounds above 1964's record low. Ontario waters contributed 44.5 million pounds, up 9.5 million from 1964, due largely to marked rise in catch of yellow perch in Lake Erie.

The 1965 U. S.-Canadian landings were worth \$10.8 million, up \$1.3 million over 1964 and the highest since 1961. U. S. catch was \$5.7 million, up \$300,000 from 1964; the Canadian catch rose \$1 million to \$5.1 million in 1965.

from 5.8 million pounds in 1964 to about 1.3 million last year, the lowest catch for this species since the 1930s.

Lake Erie waters provided the largest source of supply for Great Lakes commercial fishermen. The 1965 U. S.-Canadian catch totaled 48.6 million pounds. Yellow perch was the leader. The catch in U. S. waters was 3.2 million pounds; in Canadian, 18.6 million. U. S. landings of this species more than doubled the 1964 figure but were still far below most recent years. The Canadian increase of more than 10 million pounds over the poor 1964 season returned it to the 1961-63 level. A strong 1962 year class became available to the Erie fishery last year; it is expected to support an equal or larger 1966 production.

For the Lake Huron-Georgian Bay area, the commercial catch totaled 8.2 million pounds, or about 180,000 above 1964. An increase in U. S. production offset a moderate Canadian decline. Leading species were chubs, yellow perch, and whitefish; chubs accounted for one-third of the total catch in weight.

The Lake Superior catch was 11 million pounds; U. S. landings were nearly four-fifths of the total. This was smallest amount since early 1920s, due primarily to the drop in U. S. catch of lake herring to record low of 4.7 million pounds. The 1965 Canadian catch of lake herring was 1.6 million pounds, also down from other recent years. A brighter note was provided by the U. S. catch of chubs, which

States	1965	1964	Lake Basins	U. S. Waters		Canadian Waters	
				1965	1964	1965	1964
(Thousands of Pounds)			(Thousands of Pounds) . . . . .				
Total: . . . . .	54,156	53,559	Total: . . . . .	54,156	53,559	44,467	34,990
Illinois . . . . .	180	645	Ontario . . . . .	217	267	2,647	2,015
Indiana . . . . .	7	11	Erie . . . . .	13,524	13,354	35,096	25,381
Michigan . . . . .	19,748	19,761	St. Clair . . . . .	-	-	886	946
Minnesota . . . . .	1,613	2,079	Huron . . . . .	4,674	4,094	3,568	3,967
New York . . . . .	442	446	Michigan . . . . .	26,994	26,201	-	-
Ohio . . . . .	11,528	11,230	Superior . . . . .	8,748	9,642	2,270	2,681
Pennsylvania . . . . .	514	817					
Wisconsin . . . . .	20,124	18,570					

1/Canadian waters include Georgian Bay and North Channel.

1/Canadian waters include Georgian Bay and North Channel.

Lake Michigan continued to have largest share of U. S. commercial catch--just under 50 percent. However, the alewife, a low-value species, comprised over half the catch--14 million of the 27 million total. Larger chubs for human consumption were a more valuable gain; they totaled close to 6.5 million pounds, or 3.1 million over 1964. However, there was a sharp drop in yellow perch,

exceeded 2 million pounds in 1965 for the first time. Most of this catch was the larger size smoked for the retail market.





## Red Dye Speckles 800 Miles of Missouri River

An 800-mile stretch of the Missouri River received a series of harmless, bright, red-dye "injections" last month by hydrologists of

Interior's Geological Survey. The injections will be repeated in December, when the river's flow rate is different.

The project is aimed primarily at obtaining useful information on the behavior of water-borne contaminants under varying stream-



flow conditions. Such information will be used by Federal and State agencies for engineering applications, especially the monitoring and control of pollution in the Missouri River.

The red dye "time-of-travel" study was carried out in cooperation with the Corps of Engineers, Weather Bureau, and State agencies in Missouri, Kansas, Iowa, Nebraska, and South Dakota.

More than a ton of the red dye, known as Rhodamine BA, was poured into the Missouri at 10 sites stretching from Yankton, South Dakota, to Washington, Missouri.

The project calls for samples to be taken around the clock at 24 sites in the 800-mile reach. In December, 1,460 pounds of dye will be injected into the river when its flow rate is reduced.



### Shrimp Imports Hit New High

The United States imported record amounts of shrimp during the first six months of 1966. Mexico was by far the primary supplier.

Imports of all shrimp (fresh, frozen, canned, and dried) from all countries were 79.1 million pounds, compared with 78.6 million pounds for first-half 1965.

Shrimp is second only to tuna in per-capita consumption in the United States. The average person ate about 1.25 pounds of shrimp last year. Slightly over half the supply is imported.



### Record Season for Bluefin Tuna

Bluefin tuna are being captured in record numbers on the West Coast.

By mid-September, according to BCF estimates, the 1966 total landings and catches still at sea--nearly 17,000 short tons--had already exceeded the entire previous record year of 1962 by about 1,000 tons. Total bluefin landings for 1966 should fall between 17,250 and 17,500 tons.

There are several reasons for the banner season: Mass conversion of high-seas bait-boats to purse-seine fishing in 1960-1961 made possible increased catches of eastern Pacific bluefin tuna. New large-capacity vessels have expanded the fishery range 300 to 500 miles southward and farther offshore. Favorable weather in May and June this year contributed to a June catch of over 5,000 tons south of Punta Eugenia, Baja California, Mexico. Average 1945 to 1965 production there for the month was only 605 tons.



### Wholesale Prices and Indexes for Edible Fish and Shellfish, September 1966

Prices for some fresh finfish items rose from August to September 1966. The wholesale index for edible fishery products (fresh, frozen, and canned) was 131.4 percent of the 1957-59 average, up 1.5 percent. Compared with September 1965, the overall index had increased 13.1 percent because of higher prices for nearly all items. Prices were substantially higher than a year earlier for many fresh and frozen fishery products and all canned fish products.

The subgroup index for drawn, dressed, or whole finfish went up 2.9 percent from August to September. Prices were higher at Chicago for Lake Superior fresh whitefish (12.2 percent) because of good demand during the Jewish Holidays; Boston prices for ex-vessel large haddock were up 4.2 percent. At New York City, prices for fresh salmon were up 2.6 percent; for Great Lakes round yellow pike, they dropped 1.7 percent from August; they remained unchanged for western fresh and frozen halibut. Compared with September 1965, this September's index was down only slightly. Prices were sharply higher than in September 1965 for whitefish (43.5 percent) and slightly higher for salmon (6.6 percent); lower prices for the subgroups remaining items produced were responsible for the 0.1-percent index drop from September 1965.

#### Higher Prices for Shucked Oysters

Higher prices from August to September for standard shucked oysters (wholesale price up \$1 a gallon) at Norfolk produced 5.1-

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, September 1966								
Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes (1957-59=100)			
			Sept. 1966	Aug. 1966	Sept. 1966	Aug. 1966	July 1966	Sept. 1965
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned) . . . . .					131.4	129.5	129.7	116.2
<u>Fresh &amp; Frozen Fishery Products:</u> . . . . .					137.0	133.5	133.3	117.9
<u>Drawn, Dressed, or Whole Finfish:</u> . . . . .					135.6	131.8	135.6	135.8
Haddock, lge., offshore, drawn, fresh . . . . .	Boston	lb.	.15	.14	114.5	109.9	143.6	142.1
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.48	.48	142.0	142.0	144.2	150.8
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	1.00	.98	139.7	136.2	134.5	131.0
Whitefish, L. Superior, drawn, fresh . . . . .	Chicago	lb.	.83	.74	123.1	109.7	94.0	85.8
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.88	.89	143.2	145.7	114.6	155.5
<u>Processed, Fresh (Fish &amp; Shellfish):</u> . . . . .					137.6	130.9	130.1	107.3
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.45	.46	109.3	111.8	109.3	116.6
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	1.11	1.11	130.1	130.1	128.9	93.7
Oysters, shucked, standards . . . . .	Norfolk	gal.	9.00	8.00	151.8	134.9	134.9	122.3
<u>Processed, Frozen (Fish &amp; Shellfish):</u> . . . . .					132.0	131.5	128.0	105.3
Fillets: Flounder, skinless, 1-lb. pkg. . . . .	Boston	lb.	.42	.43	106.4	109.0	109.0	100.1
Haddock, sml., skins on, 1-lb. pkg. . . . .	Boston	lb.	.41	.40	118.7	115.8	115.8	111.4
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.32	.33	112.2	114.0	114.0	108.7
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	1.20	1.20	142.3	142.3	136.3	101.4
<u>Canned Fishery Products:</u> . . . . .					122.0	122.9	123.8	113.7
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	28.00	28.50	122.0	124.2	124.2	117.7
Tuna, lt. meat, chunk, No. 1 1/2 tuna (6-1 1/2 oz.), 48 cans/cs.	Los Angeles	cs.	12.95	12.95	115.0	115.0	117.2	102.6
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	8.00	8.00	135.6	135.6	135.6	120.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.25	10.25	131.5	131.5	131.5	128.3

1/Represent average prices for one day (Monday or Tuesday) during week in which 15th of month occurs. Prices are published as indicators of movement, not necessarily absolute level. See daily Market News Service "Fishery Products Reports" for actual prices.

Source: U. S. Department of Labor, Bureau of Labor Statistics.

percent increase in subgroup index for processed fresh fish and shellfish. Prices were lower for fresh haddock fillets (2.2 percent) at Boston, but they were unchanged at New York City for South Atlantic fresh shrimp. Compared with September 1965, this September's index was up 28.2 percent because of sharply higher prices for fresh shrimp (38.8 percent) and shucked oysters (24.1 percent). Prices for fresh haddock fillets were down 6.3 percent from September 1965.

The processed frozen fish and shellfish subgroup index rose only slightly (0.4 percent) from August to September because of higher prices at Boston for small haddock fillets (2.5 percent). But prices for frozen flounder fillets were down 2.4 percent and 1.6 percent for ocean perch fillets. Septem-

ber 1966 prices for frozen shrimp at Chicago were unchanged. The September subgroup index was 25.4 percent above September 1965; prices were higher for all items—sharply higher for frozen shrimp (40.3 percent).

The September 1966 subgroup index for canned fishery products dropped 0.7 percent from August because of lower prices for canned pink salmon (down 1.8 percent). The new season pack of Alaska pink salmon (about 2 million cases) greatly exceeded 1965's pack. Prices for all other items were unchanged from August. Compared with September 1965, prices this September were higher for all items in the subgroup, and the index was 7.3 percent higher. (BCF Fishery Market News Service.)



## STATES

### Alaska

#### SALMON PACK HIGHEST SINCE 1949

Fishermen and processors will long remember the excellent Alaska salmon season. It started with a 12-year high: 95,000 case pack of sockeye from the Copper River area. Then the Bristol Bay sockeye run provided for a pack of nearly three-quarters of a million cases.

And then came the heavy runs of pink and chum salmon to Kodiak, Cook Inlet, and Prince William Sound. For short periods, fishermen in these areas were placed on daily limits--some as low as 500 fish per day. To relieve the pressure, Governor Egan invited Japanese factoryships to come into Cook Inlet and buy excess salmon from the fishermen. In all, the Japanese purchased 220,000 fish.

About the middle of August, southeastern Alaska began to feel the impact of a tremendous run of pinks and, to a lesser extent, chums. On September 4, the pack of pinks in southeastern Alaska totaled well over a million cases. With a week to go in southeastern Alaska--and a total Alaska pack of 3,822,000 cases to September 4--it looks like a 4-million-case pack this year. One must go back to 1949 to find a better pack.

Based on comparative 1965 data, Alaska salmon catch will total an estimated 330 million pounds in 1966.

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#### JUNEAU TO GET CARGO TERMINAL

The Alaska Steamship Company has acquired 7 acres in Juneau to develop as a modern cargo-delivery terminal. The company is scheduled to begin regrading and resurfacing the plot that will be used as a van marshalling area. The new terminal will speed the handling of cargo to and from Juneau.



### New York

#### POLLUTED HUDSON RIVER EXPELS LIVING THINGS

Surveys during the past 3 summers have shown that the Hudson River, polluted by industrial wastes and sewage, is becoming an "empty river." This was reported on October 4-5 to a biological conference in Tuxedo, New York, sponsored by the New York University Institute of Environmental Medicine and the New York State Department of Health.

State, Federal, and academic experts attended. Many of them agreed that the Government and the public were aroused enough to do something. The experts believe that the Hudson will never be returned to its former state, but in 10 years it may be clean enough so that other problems can be faced.

In past 30 years, many species of shellfish and other creatures have vanished from the Hudson. The salmon, abundant in colonial times, is gone. The giant sea sturgeon, which 100 years ago fishermen stacked like wood on the wharfs, has become rare.

There have been serious declines in invertebrate species living in the river. The last survey of river life, back in 1936, listed 24 predominant species of invertebrates--



New York Times map shows Hudson River pollution areas, according to Interior Department's Water Pollution Control Administration.



spineless animals like the copepods that are food for fish. The collection of the last 3 summers did not produce specimens from 8 of these species.

Before 1880, the annual oyster crop in the lower Hudson was 10-20 million pounds. Today, oysters and clams are virtually gone.

The waters of New York Harbor are so awful that even pests like the teredo (shipworm) cannot stand them. (The teredo bores into and devastates wooden pilings.)



## Oregon

### COLUMBIA RIVER FALL FISH RUNS EXCELLENT

"Every day is fish day now," said Herman P. Meierjürgen, chairman of the Oregon Fish Commission in late September, referring to fall salmon runs in the Columbia River. "It is a very satisfying feeling to be confronted with good numbers of fish everywhere we look."

The favorable catch and escapement of summer steelhead trout, fall chinook, and coho salmon were good. The escapement goals over Bonneville Dam set by management agencies for optimum production were exceeded.

Summer-run steelhead, mostly destined for the upper Columbia and Snake River systems, were A and B, or early and late, components; their escapement levels are 85,000 and 35,000 fish, respectively. Ninety-nine thousand A and 41,000 B steelhead have been counted over Bonneville Dam, exceeding combined goals by 20,000 fish. Commercial landings were down from the average of recent years, primarily because of restricted seasons. Sport fishing in the Columbia River has been generally good, although steelhead were just starting to move over Ice Harbor Dam in good numbers. Cooler water temperatures were luring them into the upper river and the range of Idaho anglers. Even though the run is slightly below average, the good spawning escapement portends favorable returns.

### Chinook Escapement Goal Exceeded

The fall chinook escapement goal is 100,000-125,000 fish over Bonneville Dam. As of September 27, the count was 147,000, although this included a higher than usual proportion of jacks: 18 percent this year, compared with the normal 11 percent. Holding ponds have sufficient fish to exceed programmed egg-takes to fill all stations. The ponds are in the hatcheries of the Fish Commission, Washington Department of Fisheries, and Interior Department's Bureau of Sport Fisheries and Wildlife in the Bonneville pool area and below. Landings from the gill-net fishery in the Columbia River below Bonneville Dam in August and September were estimated at about 2.6 million pounds, slightly below the average of 2.7 million pounds taken during the past 10 years.

The Columbia River's commercial fishery is managed jointly by the Oregon Fish Commission and the Washington Department of Fisheries. The 2 agencies extended the late August season by 2 days to permit harvest of the apparent late fall chinook run. After a 23-day closure, they opened the September season when the escapement picture was favorable.

Sport fishing at the mouth of the Columbia has been particularly good this season. A preliminary estimate was somewhere near 59,000 fall chinook, a record rod-and-reel take.

A preliminary estimate of the troll chinook catch in late September from the Columbia River area, composed primarily of fall chinook of Columbia River origin, showed it as good as 1963, the best since 1956.

The fall chinook picture for the Columbia River is encouraging for this year. Established escapement levels have been exceeded, the hatcheries have sufficient fish for capacity egg-takes, sport catch was excellent, the river gill-net landings were about average, and the troll take better than average. The total run will be about 290,000, close to the average of the past 15 years.

### Coho Status Most Encouraging

The coho picture was the most encouraging of all. Troll landings from the Columbia

River south to the California border, which included a large proportion of the Columbia River stocks, were over 5 million pounds by late September. These landings were somewhat lower than last year's but better than any other year since 1935.

The estimated sport catch of coho at the river's mouth has been second only to the 1965 record of 247,000 fish, and much greater than the ten-year average of 90,000.

The gill-net landings of coho probably exceeded 1.5 million pounds the first fishing week of September. The season's total may exceed 1964's 1.9 million pounds--the best since 1938.

Thirteen hatcheries on the lower Columbia River operated by state and Federal fishery agencies propagated coho. It was too early to expect coho in the hatchery ponds, but there should be no problem in reaching coho egg-taking goals for all hatcheries.

The Bonneville count was 62,000, with 1,000 a day still going over. Although most of these fish are destined for hatcheries in the Bonneville pool area, many will spawn in upper river tributaries in Idaho, Oregon, and Washington. With the significant restocking and transplanting efforts in the upper watershed by Idaho, Washington, Oregon, and Federal agencies, these record counts at Bonneville may be only the beginning.

This is the third consecutive year of outstanding coho gill-net catches from the Columbia River stocks. Aiding nature, man plays increasing role in this fish explosion. Major developments in fish culture techniques, particularly the development of the

Oregon pellet by the Oregon State University Seafoods lab and the Fish Commission as the main diet for this species, have contributed immeasurably. About 6 million pounds will be fed into the Columbia River system in 1966. Successful rearing has resulted in increased returns. It has contributed to the sport and commercial fisheries in Oregon, both in ocean and river. Excellent returns are also expected to continue this year at other Oregon Fish Commission hatcheries on the coastal rivers of Alsea, Nehalem, Siletz, and Trask.



### Commonwealth of Puerto Rico

#### SHRIMP TRAWLERS MAY ALSO HAVE MARKETS FOR FISH

When the 84-foot, steel freezer shrimp trawler Amazon recently landed in Puerto Rico with 21,000 pounds of shrimp and 6,000 pounds of fish, it may have shown the potential of Puerto Rico and adjacent islands as markets for incidental catches of fish by shrimp trawlers. Of the catch landed, croaker and sea trout made up 80 percent, and 25 other species comprised the remainder.

The Amazon was launched in March and its owner said then that it would operate off the northeast coast of South America for shrimp. But it has freezing capacity, and so it can utilize finfish taken along with the shrimp. This is unusual in a field where the conventional shrimp trawlers discard the fish.



#### FOAM DEVELOPED TO RAISE SUNKEN SHIPS

Sunken ships as large as destroyers can be raised by injecting foam into them. A 500-ton barge was raised from 80 feet of water as part of a study for the U. S. Navy's Bureau of Ships by a research corporation which developed the system.

Divers first effect repairs to keep the foam from escaping and then the foam is injected. A limit of 375 feet for depth was given.

The method costs about 60 percent of that for usual salvage methods. (Undersea Technology)

## BUREAU OF COMMERCIAL FISHERIES PROGRAMS

### Alaska Fisheries Explorations and Gear Development

#### COMMANDO SURVEYS BOTTOMFISH

The charter vessel M/V *Commando* returned to Juneau, Alaska, on September 1, 1966, after a 7-week exploratory bottomfish survey off southeastern Alaska between Cape Spencer and Coronation Island. (Cruise 66-2.)



Fig. 1 - General area of operation, Cruise 66-2.

Primary objectives: (1) to locate trawlable fishing grounds and (2) obtain data on commercial concentrations of bottomfish. Secondary objectives: (1) to obtain information on suitability of fishing rough bottom with conventional otter trawls equipped with modified roller gear and (2) gain more information on bathymetric and geographic distribution of demersal fish stocks common to waters of southeastern Alaska.

Sampling gear was conventional 400-mesh eastern otter trawls equipped with roller gear. Echo-sounding transects were made to locate trawlable fishing grounds. Areas that appeared reasonably level were sampled, regardless of the bottom's consistency. Soundings ranged between 60 and 250-fathom isobaths, but were generally concentrated in waters lying over the edge of the Continental Shelf.

Forty-one of the 53 drags attempted were successful in avoiding solid hang-ups or trawl damage. While areas of soft bottom were noted, predominately hard bottom existed for much of the area surveyed. This was shown

by echo-recorder and attested by deeply scoured and dented steel otter boards and bobbins.

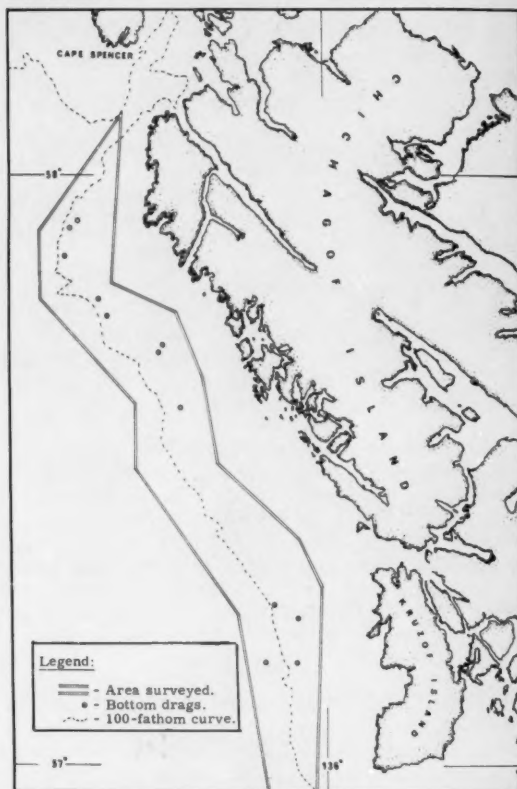


Fig. 2 - Northern area of operation.

Rockfish were the dominant group collected. The largest catch for a single species (Haul No. 48--10,500 pounds) occurred due west of Coronation Island in 120 fathoms of water, where 9,000 pounds of sharpchin rockfish were taken.

Listed in order of decreasing abundance, and collected in quantities of 100 or more pounds for any single tow, were: Pacific ocean perch (*Sebastes alutus*), sharpchin rockfish (*S. zacentrus*), Alaska pollock (*Theragra chalcogrammus*), turbot (*Atheresthes stomias*), black cod (*Anoplopoma fimbria*), silvergray rockfish (*S. brevispinis*), yellow-tail rockfish (*S. flavidus*), striptail rockfish (*S. saxicola*), rex sole (*Glyptocephalus zach*-



rus), rougheye rockfish (*S. aleutianus*), idiot rockfish (*Sebastolobus alascanus*).

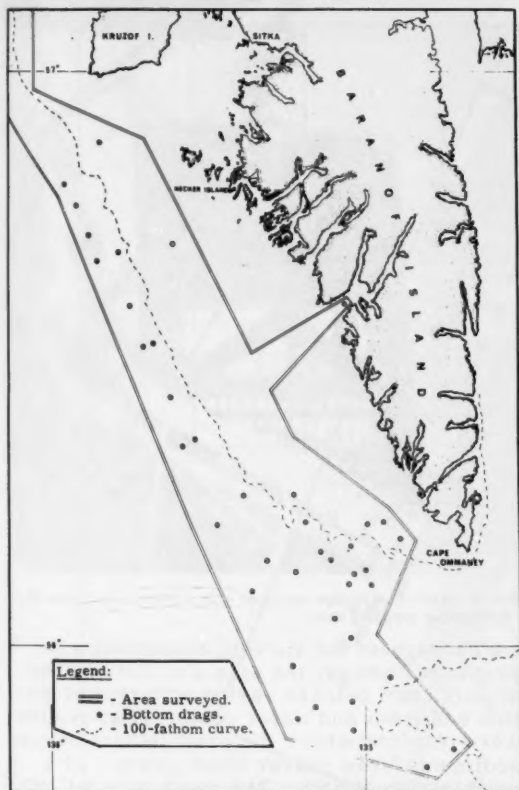


Fig. 3 - Southern area of operation.

For more information, contact: Base Director, Exploratory Fishing and Gear Research Base, Bureau of Commercial Fisheries, P. O. Box 1668, Juneau, Alaska 99801, Phone: 586-7233.



## Caribbean and Tropical Atlantic Fisheries Exploration

The George M. Bowers continued testing the efficiency of the electrical shrimp trawl in the Texas shrimping area. Daytime catches with the electrical trawl are about equal to nighttime catches with the standard trawl.



## Great Lakes Fisheries Investigations

### KAHO CONFIRMS PRESENCE OF INDUSTRIAL FISH IN LAKE HURON

Trawl fishing by the research vessel Kaho in a recent survey of the Saginaw Bay area of Lake Huron confirmed the presence of industrial fish. The 25-day exploratory cruise ended Sept. 15. A previous cruise (#34, which ended Aug. 11) had revealed alewife and carp populations large enough to support an industrial type fishery for the production of fish meal, pet food, and mink food. The average catch throughout Saginaw Bay was 300 pounds per half-hour drag and, in the southern end of the Bay, over 580 pounds. Catch rates of 250 or more pounds with the small sampling net used are considered commercially significant even for the low-value species taken. Occurrence of these fish stocks in Lake Huron may encourage the emerging Lake Michigan industrial fishery to expand its operations.

For more information, contact: Base Director, Exploratory Fishing Base, BCF, 5 Research Drive, Ann Arbor, Mich. 48103.



## Inland Fisheries Explorations and Gear Development

### HIODON EXPLORES OAHE RESERVOIR

An August exploratory and gear testing cruise in the Oahe Reservoir, on the Missouri River in South and North Dakota, produced only fair results. Drags were made for the purpose of comparing catches made by the trawls used, to collect biological data, and to explore new trawling areas. Also, 12 repetitive drags were made in a small bay over a 19-hour period to determine changes in catch. The average catch per drag for the entire cruise was 95 pounds. The central reservoir section produced 150 pounds per drag, and the upper and lower extremes produced only 55 pounds per drag. Percentage composition of the catch by weight was: carp--65; Buffalofish--8; carpsucker--8; drum--2; channel catfish--2; Northern pike, sauger, walleye, and perch combined made up the rest. This catch composition compares with those of previous cruises this year and last.

For more information, contact: Base Director, Exploratory Fishing Base, BCF, 5 Research Drive, Ann Arbor, Mich. 48103.



## North Atlantic Fisheries Explorations and Gear Development

### DELAWARE COMPLETES CLAM SURVEY

The exploratory fishing vessel M/V Delaware completed a 29-day surf clam survey cruise on September 2. (Cruise 66-6, Aug. 5-Sept. 2.) Survey work was continued in Area IV (see figure 1) off the coast of Maryland and Delaware. Catches of surf clams varied from none to 18.3 bushels per 4-minute survey tow, and from none to 13.3 bushels per 20-minute (simulated commercial) tow. An electrically-driven submersible pump was tested and utilized along with the conventional hydraulic jet dredge used for previous surf clam survey cruises.

518 survey tows were made in Area IV; 484 of these were standard tows and 34 were simulated commercial tows. Also 174 other tows were made to compare the efficiency of the submersible pump dredge with the standard hydraulic jet dredge. A specially designed 48-inch (blade width) clam jet dredge equipped with a 65 hp. electrically-driven submersible pump was used during the entire cruise (figure 2).

The same procedure of previous surveys was used. Stations were located at 1-mile intervals along 1-mile spaced grid lines. The 48-inch, hydraulic jet dredge, operating with either the submersible pump or the deck-mounted pump, was towed 4 minutes at each survey site and for 20 minutes at simulated commercial tow sites.

Results: Of the 484 four-minute survey tows completed, 74 (about 15 percent) produced catches that equaled or exceeded 1 bushel of surf clams. This is the highest ratio of good tows that were experienced to date. The largest catch for any standard 4-minute tow was 18.3 bushels. Many tows (252) produced catches of nearly 1 bushel; 157 tows produced no surf clams. Simulated commercial tows were made at 34 stations in one section of Area IV; 12 of these produced catches of 4 or more bushels.



Fig. 2 - Surf clam dredge equipped with electrically-driven 65 horsepower pumping unit.

Throughout the survey, consistent with previous findings, the size and distribution of surf clam catches varied with type of bottom sediment and water depth. Best results were obtained where the predominant bottom sediments were coarse sand, gravel, or a combination of both. The catch rate fell off considerably in the most shallow inshore waters, less than 12 fathoms--apparently because of unfavorable bottom sediments--and in the deeper offshore waters, although for the first time during survey work, occasional good catches were made at depths of 23 fathoms to 25 fathoms. Generally, the best catches were taken inshore where depths varied between 15 and 18 fathoms, and offshore where the depths varied between 18 and 21 fathoms (see figure 2).

Size of Surf Clams: The 5- to 7-inch size group, which is within the most valuable size range for commercial utilization, was predominant in surf clam catches. In some tows medium-size clams of 3 to 5 inches were taken in large numbers. The selectivity of the dredge reduced the number below this range to almost zero. The average size of clams taken in the smaller catches was generally larger than that from the larger catches.

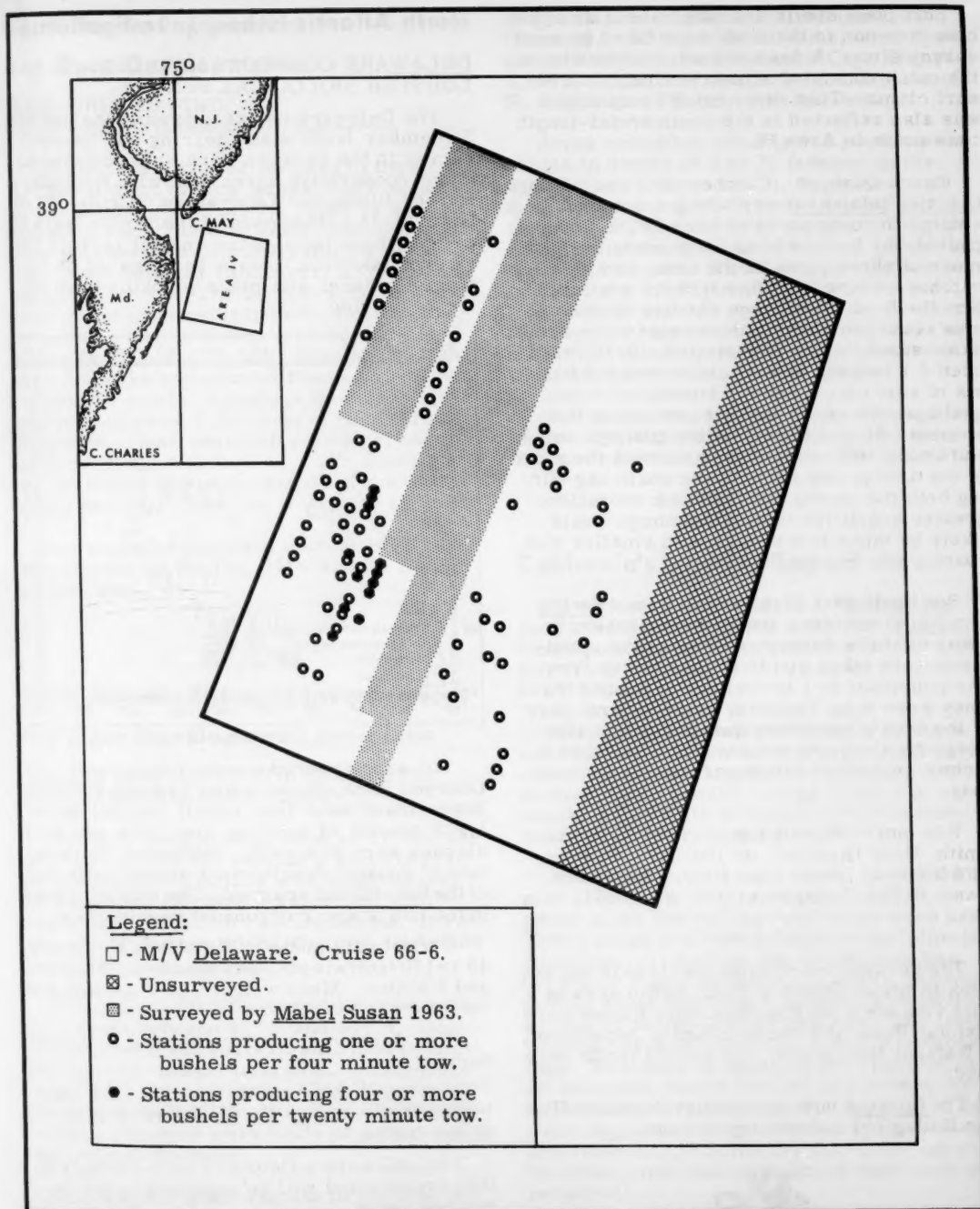


Fig. 1 - Surf clam Area IV and producing stations during M/V Delaware Cruise 66-6.

Surf clam shells and other shellfish species common to the area were taken at most survey sites. A few tows were made where the catch consisted almost entirely of live surf clams. This same catch composition was also reflected in the commercial-length tows made in Area IV.

**Ocean Quahogs:** Catches of ocean quahogs (*Arctica islandica*) were frequent and of large volume in some parts of Area IV. As expected, the best catches were made in the more offshore parts of the area, and smaller catches coming from the inshore section. For the first time, large catches of this species occurred along with the surf clam at the same survey site. One station, 18-19, produced 3.1 bushels of surf clams and 8.6 bushels of surf clams and 8.6 bushels of ocean quahogs, one of the largest catches of this species. Many of the smaller quahogs could, and undoubtedly did, escape through the slots of the dredge and rings of the chain bag during both the towing and haulback operations; greater quantities of small quahogs would likely be taken in a dredge with smaller slot spacing and bag meshes.

**Sea Scallops:** Live sea scallops (*Pecten irradians*) and dead shells were present in many offshore survey catches. Live specimens were taken at 145 of these sites from one individual to 1 bushel per 4-minute tow. They were most abundant in the central part of the area's southeast quadrant. The size range for the specimens varied from 2 to 6 inches; some dead shells were nearly 8 inches long.

For more information, contact Keith A. Smith, Base Director, or Phillip S. Parker, EF&GR Base, State Fish Pier, Gloucester, Mass. 01930, Telephone: 617-283-6554.

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The Rorqual tested midwater trawls for one week in Rhode Island's Point Judith area in a joint venture of BCF's Gloucester Exploratory Fishing Base and Rhode Island's Department of Natural Resources. PL 88-309 funds were used.

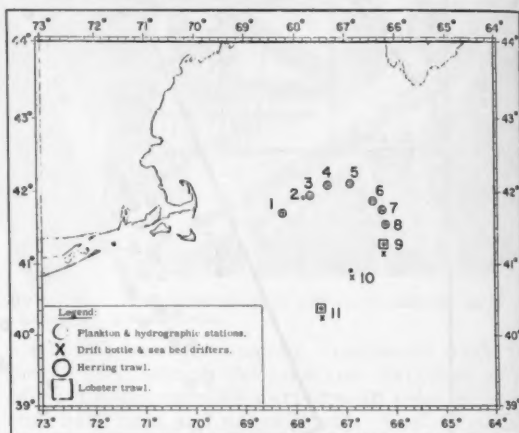
The Rorqual now is based at Boothbay Harbor Biological Laboratory, Maine.



## North Atlantic Fishery Investigations

### DELAWARE CONDUCTS HERRING AND LOBSTER BIOLOGICAL SURVEY

The Delaware returned toward the end of September from a sea herring and lobster survey in the Georges Bank area, conducted under cooperative agreement with Boothbay Harbor Biological Laboratory. (Cruise 66-7, Sept. 14-23.) Purposes of the cruise were to sample these populations and get related environmental data, obtain samples of blood from lobsters, and make plankton tows for larval herring.



Station positions of M/V Delaware Cruise 66-7.

The area covered was the northern part of Georges Bank, Corsair and Lydonia Canyons. Seven trawl sets (see chart) yielded about 1,200 pounds of herring; the 1960 and 1961 classes were dominant. Shipboard examination of gonadal development showed only few of the herring had spawned. The majority were in the late stage V of gonadal development.

8 trawl sets made at 2 stations in waters 45 to 150 fathoms yielded 7 lobsters: 2 females and 5 males. Mean weight was 3 pounds, and the range in weight was  $1\frac{1}{2}$ - $7\frac{1}{2}$  pounds.

The plankton operation obtained no larval herring.

For more information, contact BCF Biological Laboratory, W. Boothbay Harbor, Maine 04575.

The Delaware's October cruise (industrial fish exploration) will be reported in the December issue.





## North Pacific Explorations and Gear Development

### COBB CRUISES FIND ONLY SMALL HAKE SCHOOLS

Unlike 1964 and 1965, cruises by the John N. Cobb did not turn up large schools of hake off the Washington Coast. Cruise 79 ended August 5, and Cruise 80 ended September 2, after 3 weeks of exploratory fishing off Pacific Coast between Vancouver, B. C., and northern Oregon. The largest schools found were in the areas being fished by Soviet trawlers. The 4 United States vessels that are midwater trawling for hake have had to fish away from the main Soviet fleet on small and scattered schools. Landings by these 4 vessels totaled about 1,200 tons of hake through August 29. Gear research personnel have spent much time aboard our hake vessels at sea observing the performance of midwater trawls and BCF-installed telemetry systems.

For more information, contact BCF Pacific Northwest Region, 6116 Arcade Bldg., Seattle, Wash. 98101.



## South Atlantic Fisheries Investigations and Gear Development

### OREGON LONGLINES FOR SWORDFISH OFF FLORIDA'S EAST COAST

The R/V Oregon completed an 11-day exploratory cruise off Florida's east coast to conduct seasonal fishing with longline gear for swordfish (*Xiphias gladius*) and with trawls for bottomfish concentrations. It returned to St. Simons Island, Georgia, on August 27. (Cruise 111, August 16-27.)

Five 60-basket (600 hooks) longline sets were made between 27° N and 30° N. Buoy drops on each set varied from 5 to 50 fathoms spaced at 10-basket intervals. Hooks were baited with thread herring (*Opisthonema oglinum*) and mullet (*Mugil sp.*) on alternating baskets. All sets were made at sunset and retrieved at daylight.

One longline gear was set in the axis of the Gulf Stream off Stuart, Florida, 220 fath-

oms; two sets on Blake Plateau (Antilles Current) in 450 and 540 fathoms; one beyond the 1,000-fathom isobath east of Cape Kennedy, 2,600 fathoms, and one in the Gulf Stream off St. Augustine, Florida, 345 fathoms.

Seven swordfish totaling 664 pounds were caught in depths of 5 to 30 fathoms in the Gulf Stream (Stuart and St. Augustine) and Blake plateau. Eleven tuna (4 species) weighing 342 pounds were caught on longline. No large concentrations of food or industrial fish were located. The 2 best single catches of fish were 1,304 pounds (spots, croakers, and whiting) and 843 pounds (spots, croakers, whiting, and silver trout) in the bight of Cape Kennedy. Small quantities of scattered brown, pink, and white shrimp were caught.

For more information, contact Base Director, BCF Exploratory Fishing and Gear Research Base HQ, Pascagoula, Miss. 39567.



## California's Nautilus Tags Crabs

The State of California's M/V Nautilus conducted a crab-tagging operation in the coastal waters off San Francisco and Bodega Bay from August 6-30. (Cruise Report 66-N-9 Crab.)

Purposes of the mission were: to tag a maximum of 2,500 female and sublegal male crabs for survival, growth, and migration studies; to determine mating activity of male crabs and fertility of female crabs and abundance of crabs in tagging areas.

Gear and Operations: Thirty commercial-size crab traps without escape ports and power block for pulling crab traps were used. Thirty traps were set at each of the following locations: (1) Bodega Bay (2) Drakes Bay (3) Rocky Point (4) San Francisco Lightship and (5) Point San Pedro. Fished with squid as bait in depths of 7-17 fathoms. The traps were pulled daily except for two 48-hour soakings. Two days of fishing were required at all locations except Drakes Bay, where one day obtained crabs needed for tagging. They were tagged with vinyl-plastic spaghetti tags and released the same day they were caught. Shoulder width and condition of each crab was recorded.

Results: Five hundred crabs--equal number of males and females--were tagged at each station except Bodega Bay (314 males, 186 females) and Drakes Bay (342 males, 158 females); in all, 1,406 males and 1,094 females. Only active crabs, having both chela intact and missing no more than one walking leg, were tagged.

5,316 crabs were caught in the 310 traps set: 707 legal males, 2,341 sublegal males, and 2,268 females. The average catch per trap-day was 17.2 crabs (2.3 legal males, 7.6 sublegal males, and 7.3 females). Drakes and Bodega Bays had the highest catch of legal-sized crabs per trap-day with 10.6 and 3.5. Of total crabs caught, 6.1% of legal males and 38.1% of sublegal males were in a soft condition.

Mating marks were found on 409 males; 345 on legal and 64 on sublegal crabs. The fertility of females was determined by the presence of sperm in their spermatheca. Forty-four females were checked: 43, or about 98%, were fertile. Ovaries varied in color from light orange to red-orange.



## Distress Signal Recommended for Fishing Vessels

BCF has developed a distinctive and highly visible banner for use by fishing vessels as a recognition and distress signal.

The international orange vinyl-coated nylon banner with bullseye center measures 10 by 5 feet. It should be displayed in the rigging or on top of the wheelhouse whenever an emergency or any other situation requires assistance. When this signal is displayed, vessels awaiting assistance by the Coast Guard Search and Rescue Branch can be readily identified.

The signal is a definite aid to searchers when the disabled vessel does not have radio-telephone communication or is not in a group of similar size craft.

The banner has been shown in New Bedford and Gloucester and will be displayed in all major New England fishing ports.

It is recommended that all commercial fishing vessels carry this distress signal.



## Galveston Records Shrimp Culture Gains

Much new progress in studies of shrimp culture has been made at the Galveston, Texas, laboratory. Both white shrimp and seabobbs were successfully reared to postlarvae from eggs spawned in the laboratory. This followed the successfully rearing of brown and pink shrimp--and rounded out the rearing of the 4 most important commercial shrimp species.

The laboratory developed techniques for mass culture that permitted large numbers of shrimp larvae to be grown under controlled conditions for either detailed physiological studies or the stocking of enclosed brackish-water ponds.

Studies also are under way on the feasibility of growing shrimp in ponds under semi-natural conditions. In one experiment, brown shrimp grew from an average size of one-half inch to 3 inches in 120 days. White shrimp in the same experiment grew to 5 inches. This is an average growth of nearly one-quarter inch per week. A second study using 4,000 white shrimp spawned and reared to post-larvae in the laboratory showed increases of one-half inch to 4 inches in 90 days in one of the culture ponds. This study is continuing.



## Lobster Research in Boothbay Harbor

The SCUBA diving team at the Boothbay Harbor laboratory is making extensive observations of lobsters under natural conditions in representative areas along the Maine coast. Its findings suggest that lobsters definitely seek shelter in burrows during daylight hours and occupy much of the available habitat. It may be significant that those lobsters seen in the open during daylight hours show evidence of attack: missing claws and other appendages. Lobster fishermen and scientists have long observed that certain artificial areas--some rock jetties and the rock sides of the Cape Cod Canal--have been heavily colonized by lobsters. So the possibility of increasing the amount of lobster habitat exists. However, a recent attempt by Canadian scientists to construct an artificial lobster reef has been only moderately successful to date.



## International Trade Promotion Office Completes Its First Full Year

At 8:00 am, Sunday, September 11, hundreds of Viennese were queued up in front of 20 ticket booths. They were not waiting to see a sporting event, listen to Strauss waltzes, or watch folk dancers in lederhosen and dirndls. They were eagerly awaiting the chance to buy admission to Austria's annual International Fall Fair, one of Europe's largest.



Fig. 1 - Samuel J. Hutchinson of BCF gives President Franz Jonas of Austria (left) a closer look at one U.S. entry. Behind the President is Henry A. Baehr, U.S. Agricultural Attaché, Austria. To Hutchinson's right is Herr Strauss, President of Vienna Fair Company.

For the Viennese, whose own incredibly rich pastries and foods make tourists gasp, the fair was an embarrassment of riches: acres of food and, almost center stage, live shellfish and fresh, frozen, and canned fish from the United States. TWA had flown in these live and fresh entries just the day before: from Florida, Massachusetts, and Washington. The Viennese were thrilled by the sight and taste of them. By the end of the

first four days of the fair, which ran from September 11-18, 150,000 persons had made their way through the U.S.A. section, including the President of Austria.

United States participation was sponsored by the Department of Agriculture, an old hand at fairs, and cosponsored by BCF's Office of International Trade Promotion, which was rounding out its first full year of foreign trade promotion. For many years, Agriculture showed the riches of the American soil and farm; now BCF was exhibiting some of the sea's riches.

Fourteen U. S. firms displayed 35 different products: from inexpensive squid to caviar. Most of the products were new to Vienna. Those attracting most interest were cherry-stone and soft shell clams, quahogs, oysters, shrimp, cape and sea scallops, swordfish, Spanish mackerel, pompano, sea trout, mullet, flounder fillets, Dungeness crabs, and Pacific salmon. Shrimp products, which are in considerable demand throughout the world, were eyed carefully. And U. S. caviar, roe of the Great Lakes whitefish, won praise from a leading Viennese gourmet importer.

### Maine Flew Lobsters to Munich

BCF also participated in the International Exhibition of Groceries and Fine Foods, IKOFA, at Munich, Germany, September 17-25. For this event, the same distributors, with the addition of the State of Maine, displayed about 35 different species, including live lobsters and clams, and other fresh, frozen, and canned fishery products. Here again many of the products were new to the visitors. One highlight was a tank of live Maine lobsters; Maine cooperated by flying in 100 pounds of live lobsters every 3 days--and experts to display the lobsters and provide answers.



Fig. 2 - The fresh fish booth at the international food fair in Vienna.



Other "eye catchers" in the fresh fish display were salmon and Dungeness crab from the west coast; pompano and Spanish mackerel from Florida; and scallops, cherrystone clams, and swordfish from Boston.

In a special lounge reserved for tradespeople, a \$100,000 order for 25 tons of king crab was placed in 5 minutes. Large hotels and airlines showed much interest in this item. Firm orders for U. S. fishery products are expected to continue as a result of the trade promotion at these two fairs.

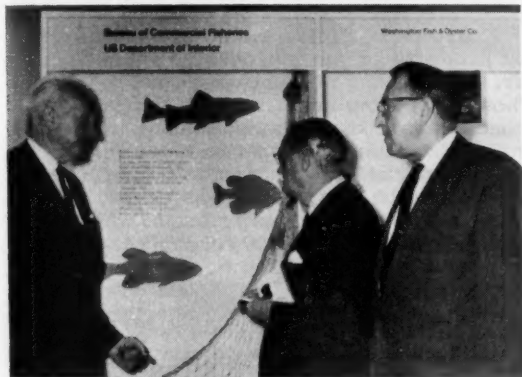


Fig. 3 - Bureau of Commercial Fisheries entrance to the trade lounge. Left, Hutchinson; center, James W. Riddleberger, U. S. Ambassador to Austria; Agricultural Attaché H. A. Baehr.

Before Vienna and Munich, BCF took part in the fairs at Manchester, London, Milan, Brussels, and Cologne.

#### How BCF Helps Exporters

The BCF International Trade Promotion program is designed to increase present markets abroad for United States fishery products and to find outlets for new products. The emphasis to date has been on Western Europe because its increasing affluence is reflected in its greater receptivity to gourmet items. The fact that the Department of Agriculture is focusing on this area is another motivating reason. But BCF sees other markets too in the future.

The program brings buyer and seller together. It gives the U.S. exporter a chance to show his products, to find trained foreign agents to represent him, and to aid negotiations that have been conducted only by letter. BCF offers assistance to any firm that wants to participate, and an exporter receives

much help: instructions on what he can send and how to send it (he only provides the product and pays for transportation); display space is made available at no cost; he receives publicity abroad he could not buy; his name appears in the display booth over his products. His expenses can be written off for tax purposes as costs of doing business. And, under a new BCF policy initiated at Vienna this September, he does not have to send a representative to the fair. BCF is there to work with interested foreign tradespeople: Trained Bureau marketing specialists help these importers fill out fishery product inquiry slips--and then transmit these to the U.S. firms able to make quotations and supply the products.

Among the highlight of sales resulting from the fairs were a \$300,000 order for frozen salmon from Cologne, and another \$100,000 order for king crab at London.

#### Some Results of the Program

The display of American fishery products abroad has won thousands of fans. At Manchester, England, 10,000 samples were distributed to visitors: king crab, shrimp, scallops, salmon, squid, and lobsters. BCF is not above using culinary magic to win over buyers. The deep-fried, breaded, soft-shelled clams were "eaten up" by German, Belgian, and Italian fair visitors. The breaded clams opened the door to sales of this frozen food delicacy.

The experience of the first full year indicates that quality ready-to-eat items now can compete for the attention and money of the European housewife. Exhibitors know there is an expanding market for U.S. frozen and canned specialties--including shrimp, clams, caviar, king crab, mullet, squid, and salmon. Some visualize a potential for fresh whole Alaska salmon--flown over the North Pole to foreign markets.

Heading the International Trade Promotion Office is Samuel J. Hutchinson, a BCF veteran of 34 years who was Regional Director of the Bureau's Pacific Northwest Region in Seattle, Washington. His associates are A.L. Morel, who did much spadework for the foreign program and forged a network of friends and industry contacts abroad, and Lester F. Reynolds, who came to the Bureau after extensive experience in the sales and promotion of frozen products of the U.S. food industry.



Fig. 4 - Public views fresh fish booth, which received television coverage.

BCF is fielding an active and resourceful team of international trade experts. Their efforts should increase exports of high-

quality U. S. fishery products. They invite industry to participate in their promotional efforts.



#### CLAMS CLEANED BY RADIATION

Hard shell clams (quahogs) from polluted water can be cleaned in one day with salt water purified by ultraviolet radiation, according to two University of Rhode Island professors. In the proposed plant designed by the professors, salt water radiated with ultraviolet light would pump across the clams continuously for 24 hours. The clams would get rid of the polluted coastal waters in which they grew by siphoning the sterilized water in and out of their bodies.

It is estimated that there would be quite a decrease in the cost of cleaning a bushel of clams--25 cents instead of the present cost of \$1.85. (Reprinted, with permission from Science News, weekly summary of current science, copyright 1966, by Science Service, Inc.)

## FEDERAL ACTIONS

### Economic Development Administration

#### STUDY OF PACIFIC HAKE'S COMMERCIAL POSSIBILITY APPROVED

The Economic Development Administration (EDA), U. S. Department of Commerce, recently approved a \$70,000 grant for an economic feasibility study of a commercial hake fishery off Washington's coast. BCF's Pacific Northwest Region will conduct the study. Grays Harbor Regional Planning Commission, Aberdeen, Wash., requested the study.

A processing plant has been built at Aberdeen, but hake supplied by local fishermen are insufficient for normal operations. Through "on-the-job" training featuring new equipment and techniques, BCF will try to aid the fishermen supply sufficient raw material to make the industry survive and grow.

Chartered trawlers will be used in the study to determine: (1) location of high concentrations of Pacific hake during each stage of fishing season; (2) most productive gear and other fishing techniques to use; (3) proper techniques for taking catch from gear; (4) best method for handling catch on board vessels and unloading it; (5) most desirable size and use of trawler crews; and (6) commercial catch rates and cost of production per ton of hake. (U. S. Department of Commerce, September 28, 1966.)



### Food and Drug Administration

#### BLACKFIN PROPOSED TO BE INCLUDED IN U. S. STANDARDS FOR CANNED TUNA

The Food and Drug Administration published in the Federal Register, Sept. 15, 1966, a Notice of Proposed Rule Making to amend the standard of identity for canned tuna (21 CFR 37.1) to include blackfin tuna in the class known as tuna fish. The notice resulted from a petition filed by the National Cannery Association, Washington, D. C.

The petition argued that the blackfin tuna is caught in waters fished for tuna for canning; though formerly believed identical with either albacore or bigeye tuna, it is now shown to belong to a separate species not recognized by the standard; it is outwardly distinguishable only briefly after catching; it belongs to the class known as tuna fish both by established usage and taxonomic classification.



### Department of the Interior

#### APPLICATIONS FOR FISHING VESSEL LOANS

The following applications were received for loans from the U. S. Fisheries Loan Fund to help finance the purchase of fishing vessels:

James O. Russel, Jr., Star Route, Box 5, Brownsville, Texas 78520, applied for loan to help buy a new 67-foot steel vessel for all commercial species of shrimp. Published in Federal Register October 8.

Salvatore and Providenza Curcuro, 33 Hodgkins St., Gloucester, Mass. 01930, applied for loan to help buy a used 90-foot registered length wood vessel for groundfish. Published in Federal Register October 5.

Frederick N. Wedel, P. O. Box 193, Bodega Bay, Calif. 94923, applied for a loan to help buy a used 40.9-foot registered length wood vessel for salmon and Dungeness crab. Published in Federal Register October 5.

Regulations and procedures governing fishery loans have been revised and no longer require an applicant for a new- or used-vessel loan to replace an existing vessel (Public Law 89-85; Fisheries Loan Fund Procedures--50 CFR Part 250, revised August 11, 1965).

Note: See Commercial Fisheries Review, October 1966 p. 15.



## Eighty-Ninth Congress (Second Session)

The Congress was aiming for adjournment on Saturday, October 22.

### FISHING LIMIT EXTENDED TO 12 MILES

On October 15, President Johnson signed the bill (S. 2218) extending the exclusive fishery zone of the United States from 3 to 12 miles off the coasts.

### SEA GRANT COLLEGES

The House adopted the conference report on H. R. 16559, the proposed National Sea Grant College and Program Act of 1966. This cleared it for President's signature. The bill authorizes the establishment of programs of education, training, and research in marine sciences.

### RESEARCH CONTRACTS

The Senate on October 10 concurred in House amendment to S. 3460, authorizing Interior Secretary to contract for scientific and technological research. This action cleared bill for President's signature.

### WATER POLLUTION CONTROL

A \$3.7 million water pollution control bill (S. 2947) moved through Senate and House and was sent to the White House. It seeks to make more effective the programs conducted under the Federal Water Pollution Control Act. Most of the money is slated for States as matching grants for construction of sewage treatment plants.

### COMMODITY PACKAGING AND LABELING

The Senate agreed on October 14 to House change of S. 985. Bill went to White House. It provides for more government regulations on labeling and packaging food, drugs, cos-

metics, and household supplies. It calls for more uniformity in labeling packages--and voluntary moves toward uniform packaging.

### FISH PROTEIN CONCENTRATE

The House passed a compromise bill (S. 2720) for a pilot program to produce low-cost protein concentrate from waste fish. The bill would authorize appropriations up to \$1 million to build a Government-owned plant, and \$1,555,000 annually for 5 years to lease a second plant and operate both plants.

### RIVERS AND HARBORS

The House passed on October 19 a \$613 million rivers and harbors authorization bill. It provides for flood control, navigation, beach erosion, and other public works in 24 States. The Senate passed an \$821 million version a week earlier.

### FUR SEAL CONSERVATION AND PRIBILOF ISLANDS ADMINISTRATION

Conferees in executive session on October 10 agreed to file conference report on difference between Senate- and House-passed versions of S. 2102, designed to protect and conserve fur seals on the Pribilof Islands.

### INLAND GREAT LAKES AND WESTERN RIVER RULES FOR SMALL VESSELS

The House on October 13 reported (H. Rept. 277), with amendment, S. 1349, to amend the inland, Great Lakes, and western river rules concerning sailing vessels and vessels under 65 feet.

### JELLYFISH CONTROL ELIMINATION IN COASTAL WATERS OFF U. S.

The Senate Committee on Commerce met in executive session on October 13 and ordered favorably reported, with amendment, H. R. 11475, which provides for control of jellyfish and other such pests in U. S. coastal waters.





## FEATURES

### THE CHANNEL NET FOR SHRIMP IN NORTH CAROLINA

By James F. Guthrie\*

From 1950 through 1963, channel nets in North Carolina took over 3 million pounds of brown and pink shrimp. The nets are operated from early spring to late summer in Bogue and Core Sounds, but mainly around Harkers Island. The channel net, a specialized fishing gear similar in design to a trawl (fig. 1), was developed during the mid-1930s in coastal North Carolina and has been generally confined to use there. Burkenroad

(1949) and Broad (1951a, 1951b) referred to the use of channel nets in the straits near Harkers Island, N. C. (fig. 2). A bag net closely resembling the channel net is used to take bay shrimp in California (Bonnot, 1932).

Using tidal currents and staffs to maintain its shape and position, the channel net fishes the surface and middle depths rather than the lower depths. The net's possibilities were first realized by fishermen from Harkers Island after a storm in 1933 enlarged Barden Inlet (inside Cape Lookout) and thereby created conditions that resulted in stronger tidal currents in Back and Core Sounds. The fishermen observed that large numbers of shrimp used Barden Inlet and other channels when moving out of the estuaries to the ocean; the shrimp were swept along on ebb tide and crowded the near-shore areas out of the main current on flood tide. In 1936 an enterprising fisherman set an otter trawl in nearby Beaufort Inlet between two anchored boats and made a good catch of shrimp on an ebbing tide. By 1938 this method of fishing and the net itself had evolved into their present state. Since 1958, however, use of the channel net has decreased markedly, although annual earnings per net have remained near or appreciably above the average established during the years 1950-57.

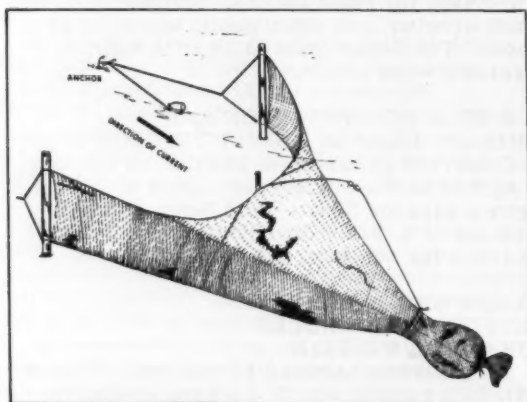


Fig. 1 - The channel net in operation.

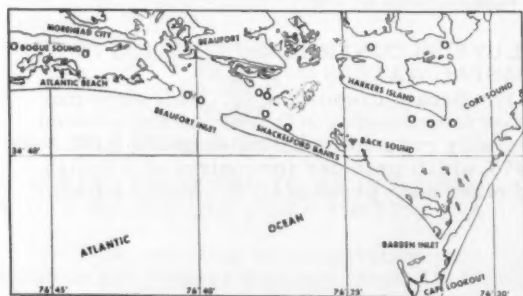


Fig. 2 - Map showing fishing areas.

#### DESCRIPTION OF GEAR

Figure 3 shows the main parts of a typical channel net. The numbers shown represent the number of meshes. A net may be as much as 100 feet across the mouth, vary from 8- to 14-feet deep, and have a cod end that extends about 40 feet behind the wings. The wing and body meshes measure  $\frac{3}{4}$ -inch and are constructed of No. 6 thread; the cod-end meshes are  $\frac{1}{2}$ -inch and made of No. 9 thread. The foot and head ropes are at least  $\frac{1}{2}$ -inch

\*Biological Technician, Bureau of Commercial Fisheries, Biological Laboratory, Beaufort, N. C.

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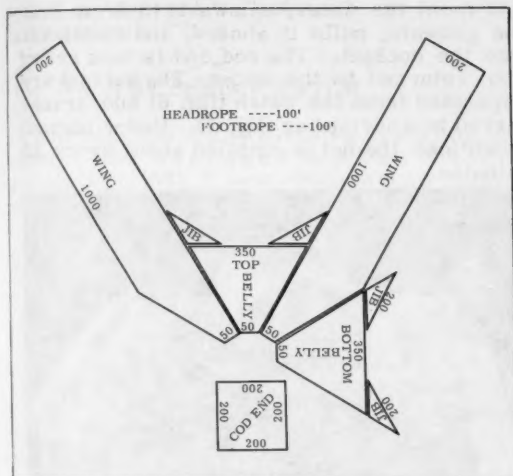


Fig. 3 - Components of a 100-foot channel net.

in diameter, and the net is "taken up" one-third, i.e., 9 meshes occupy the space of 6.

Accessory equipment consists of a power boat, anchors, rope, staffs, buoys, and often a 14- to 16-foot skiff. The open, shallow-draft boats range from 17 to 26 feet long and are powered with modified, 85- to 300-hp. automobile engines. The power boat is used for transportation to and from the fishing grounds, carry and set channel-net anchors and, occasionally, to fish the net. The skiff, however, usually carries and fishes the net. Stock or plow-type anchors of 25 to 50 pounds are commonly used to hold the net in fishing position, although stakes driven into the bot-

tom are frequently used for this purpose. The anchors are attached to bridles on each wing of the net by 100-foot (or longer) lengths of  $\frac{1}{2}$ -inch rope. A 25-foot line suspended from a buoy is usually fastened to the shank of each anchor to help free it from the bottom (fig. 1). The mouth of the net is held open by three upright staffs (pine or gum saplings) between the foot and head ropes, usually one in the middle and one at each end. Accessory staffs are placed between the center and end staffs in wider nets. End staffs are 10 to 16 feet long and 4 to 6 inches in diameter at the bottom. The center staff is 16 to 18 feet long and 2 to 3 inches in diameter at the bottom. A rope of at least  $\frac{1}{4}$ -inch diameter, buoyed by 2 or 3 corks, runs from the top of the center staff and encircles the bunt of the cod end (fig. 1). This line is used to cinch the bunt and lift the cod end out of the water. Neither corks nor leads are used on the head and foot ropes of most channel nets.

#### SETTING AND FISHING THE NET

When loading the net in the skiff prior to departure on a fishing trip, the end staffs are placed aboard first with their bottoms pointing toward the bow. The cod end is then pulled loosely into the stern and the bridles on both end staffs are left clear. The anchors and attached ropes are placed in the boat, the rope ends tied together, and the ropes coiled into the stern. A buoy attached to the joined anchor ropes permits the fisherman to retrieve these ropes when the net is being set.

The net is set only at night on ebb tide. After a fishing site is selected, one anchor is



Fig. 4 - Fisherman setting channel net.

lowered and the other is carried across the channel until the joined ropes are taut, at which point the second anchor is lowered and set. A minimum tidal current velocity of 2 knots is required for the effective use of the channel net; otherwise, the current will not "bloom" or fill out the bunt. When the ebb tide has reached a minimum velocity of 1 or 2 knots, the buoy marking the joined anchor ropes is retrieved and the top end staff is tied to one anchor rope by means of the bridle and placed in the water (fig. 4). The tide is then allowed to pull the net from the boat. In sequence, the center staff is lowered and the cod end is thrown overboard so as not to foul on the bottom of the center staff. When the remaining end staff is tied to the other anchor rope and placed in the water, the net is then in fishing position. One of the anchors may have to be moved to properly align the net with the current.

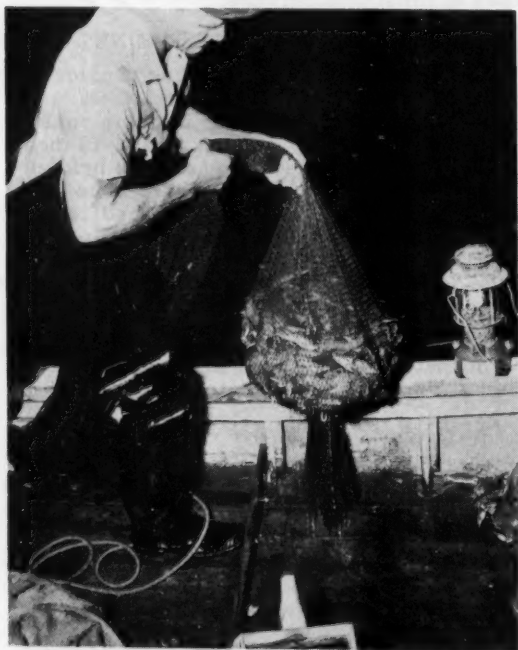


Fig. 5 - Fisherman lifting cod end of channel net into boat.

The skiff is positioned over the cod end of the net by securing the bow to the rope leading from the center staff. When removing the catch, the fisherman first brings the cod end to the side of the boat by pulling on the center line (fig. 5), shaking the catch into the cod end in the process. He then lifts the cod

end from the water, allows it to drain over the gunwale, pulls it aboard, and empties it into the cockpit. The cod end is then retied and returned to the water. The shrimp are separated from the catch (fig. 6) and transferred to a burlap bag (fig. 7). Under normal conditions the net is emptied about every 15 minutes.



Fig. 6 - Culling the catch.

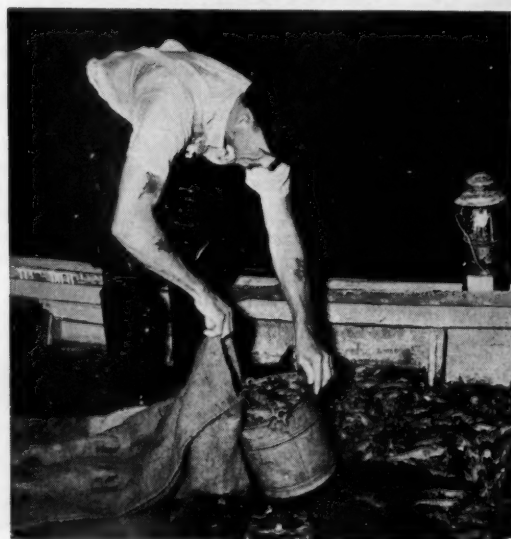


Fig. 7 - Bagging the culled catch.

About one-half hour before the tide slacks, (i.e., at late ebb), the channel net is taken aboard by freeing one anchor and letting the net trail in the current. The boat is positioned broadside to the current while the staffs and net are pulled aboard. It is important that the net be removed from the water before the tide changes, otherwise it would turn inside out. Normally the skiff with net and anchors is left



behind to reserve the same site for the next fishing night.

### THE SHRIMP CATCH

Although the annual catch of shrimp in channel nets averages less than 250,000 pounds (1950-63), it nevertheless contributes significantly to the economy of Harkers Island and surrounding communities. Fishing begins in the middle of May and extends into July--production usually peaks in June. The catch is composed mainly of pink shrimp (*Penaeus duorarum*) that vary in size from 45 to 55 per pound (headless count). Brown shrimp (*P. aztecus*) of comparable size are taken in late June and make up two-thirds of the catch by early July (Broad, 1951a). The annual catch of shrimp per channel net during the years 1950-63 ranged from slightly over 8,000 pounds in 1953 to about 1,300 pounds in 1956 (table). During the years 1957-63, catches have averaged about 4,600 pounds per net.

Other species entering the channel-net catch in notable quantity include: blue crab (*Callinectes sapidus*), for which a good market has developed in recent years; Atlantic menhaden (*Brevoortia tyrannus*); and the southern harvestfish (*Peprilus alepidotus*).

The number of licensed channel nets has decreased since 1955 because: (1) many

Year	Units of Gear	Quantity		Value	
		Total	Per Net	Total	Per Net
		... (Pounds) ...		... (Dollars) ...	
1950	98	417,700	4,262	104,425	1,066
1951	108	235,400	2,180	54,142	501
1952	73	287,500	3,938	57,500	788
1953	63	508,100	8,065	127,025	2,016
1954	122	381,100	3,124	76,220	625
1955	114	225,000	1,974	49,500	434
1956	57	75,000	1,316	18,750	329
1957	52	250,000	4,808	67,200	1,292
1958	55	300,000	5,455	79,800	1,451
1959	28	125,000	4,464	24,637	880
1960	22	100,000	4,545	21,581	981
1961	15	50,000	3,333	10,938	729
1962	20	75,000	3,750	26,250	1,312
1963	20	125,000	6,250	37,500	1,875

Source: "Fishery Statistics of the United States," Statistical Digests for the years 1950-63, Bureau of Commercial Fisheries, U. S. Fish and Wildlife Service.

channel netters are part-time fishermen who only purchase a license when the shrimping outlook is favorable (it has not been in recent years); (2) these fishermen previously constructed their channel nets of cotton webbing from discarded (menhaden) purse seines which are now made of more durable nylon and therefore no longer constitute a reliable source of material; and (3) many channels, formerly productive, have been filled with sand reducing them to shallow streams that are no longer suitable for fishing with a channel net.

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### OCTOPUS UNDERGO CHAMELEON-LIKE COLOR CHANGES

The shy and retiring octopus is the quick-change artist of the sea. When disturbed or excited, it often turns brick red as though livid with rage. When frightened or cornered, the animal may turn white or gray. Waves of color may move across its body. In a natural setting, it attains almost perfect camouflage by matching its surroundings. (Sea Frontiers, July-August 1966.)

Your net will not bring up the elephantine mammoth, 50-foot shark, or 40 million-year-old tree--but nets have raised their fossils.

## RARE FOSSILS DREDGED OFF ATLANTIC COAST

By Roland L. Wigley\*

During the past 2 years, 5 rare fossils of plants and animals of considerable scientific importance have been collected by commercial fishermen in offshore waters of Massachusetts, New York, and Virginia (fig. 1). These specimens were dredged from the ocean bottom during regular fishing operations with otter trawls or scallop dredges and brought into port by

alert and inquisitive fishermen. John V. Mahoney, BCF representative in New Bedford, Mass., forwarded the specimens to the author at the Biological Laboratory, Woods Hole, Mass. Some of the fossils were loaned by the owners for a short period of time for examination; others were donated for analysis or deposited in the Smithsonian Institution, Washington, D. C. Persons finding similar specimens should send them to scientific institutions.

### GIANT SHARK TOOTH

A fossil shark tooth 4 inches long and  $4\frac{1}{2}$  inches wide at the base (fig. 2) was dredged by

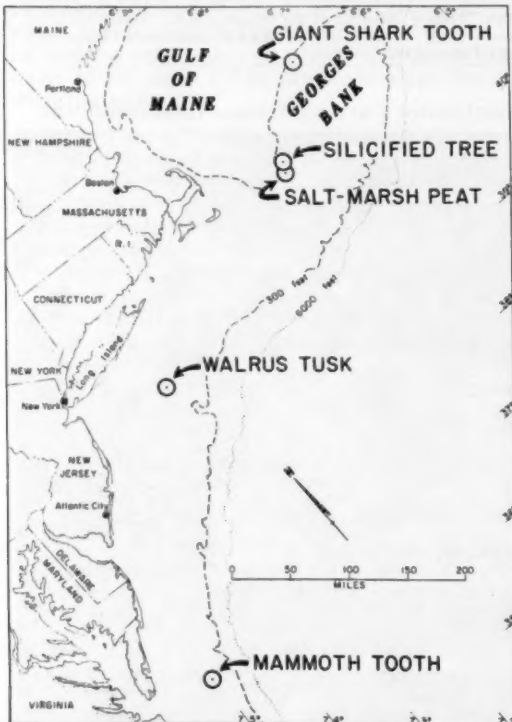


Fig. 1 - Collection sites of fossils recently found off northeastern coast of United States.



Fig. 2 - Fossil tooth from the giant shark *Carcharodon megalodon*, an extinct species.

\*Fishery Research Biologist, Biological Laboratory, Bureau of Commercial Fisheries, Woods Hole, Mass.  
Photo Credit: R.K. Brigham and R.B. Theroux.

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Timothy Furtado, a fisherman aboard the commercial dragger Explorer, September 14, 1964, from the northeastern part of Georges Bank--42°02' north latitude and 67°27' west longitude. Water depth here is 20 fathoms (120 feet).

This tooth is from the giant shark, Carcharodon megalodon, now extinct. These sharks, voracious predators, lived during the Miocene Epoch, about 20 million years ago, and were 40 to 50 feet long. They are close relatives of the Maneater Shark (White Shark) now common in tropical and temperate seas.

The tooth has a generally smooth surface with a minutely serrated cutting edge. It is light brown along the distal margins, grading to dark brown and black in the central and basal portions of both inner and outer faces. The inner face is very slightly concave; the outer face is slightly convex. Original compounds of which the tooth was formed have been phosphatized, and a phosphorite concretion is at-

tached to the tooth's base. The concretion is only of moderate size at the base and inner face, but on the outer face it extends more than half way from base to apex.

#### SALT-MARSH PEAT

One of the largest samples dredged from the ocean bottom and brought in for identification consisted of several chunks of salt-marsh peat (fig. 3) found by Norman Lepire, skipper of the Ruth Lea, a scalloper operating out of New Bedford, Mass. Several bushels of peat were dredged during fishing for sea scallops (Placopecten magellanicus) at a depth of 32 fathoms (192 feet) east of Massachusetts along the western end of Georges Bank, one of New England's most famous fishing grounds. Location of the peat deposit, determined from Loran-A bearings, is 41°09.3' north latitude and 68°43.2' west longitude, which places it at the northern end of a large submarine sand wave. Judging from the dredge's action, the peat probably occurs in small patches in an



Fig. 3 - Salt-marsh peat dredged from western end of Georges Bank by the scalloper Ruth Lea. Surface of peat exposed to water (left) shows borings, some occupied by The Rough Piddock, a species of boring clam. Note large twigs in the peat from subsurface layers (right).

area  $\frac{1}{2}$  mile square. A sample of peat from this locality was studied in collaboration with Dr. K. O. Emery of the Woods Hole Oceanographic Institution and Dr. M. Rubin, U. S. Geological Survey.

This peat is a brown-colored compacted mass of plant fibers, predominantly salt-marsh grass (*Spartina*), containing numerous twigs of woody land plants. Twigs and pollen were mainly spruce with some pine and fir; spores were largely from peat moss (*Sphagnum*). Freshwater diatoms and rootlets of cedar were also present. Numerous borings contain specimens of *Zirfaea crispate*, a boring clam sometimes referred to as the Rough Piddock--alive at the time of the collection.

The presence of many rhizomes of salt-marsh grass is of particular interest because this grass inhabits a rather limited range between mid-tide and high-tide levels. It thus marks a past sea level rather accurately.

Radiocarbon dating showed that the peat was formed 11,000 ( $\pm 350$ ) years before the present, or about 9,000 B. C. This deposit is believed to be the oldest submerged salt-marsh peat in the world.

Evidence from numerous sources indicates that the enormous glaciers which pushed southward across New England during the Pleistocene Epoch retreated from the Connecticut coast more than 13,500 years ago, from Martha's Vineyard 12,700 years ago, and from Boston 12,300 years ago. The sample described here indicates that 11,000 years ago sea water stood at a level 32 fathoms below present-day sea level. The area presently known as Georges Bank was then an ice-free island. It may be called St. Georges Island in keeping with the bank's earlier name--St. Georges Bank. The peat offers the first solid evidence that Georges Bank was previously an island. Elevation of the island above sea level after the glaciers retreated and the peat was forming is estimated to have been 100 feet or more. At about that time the island was covered, at least in part, by boreal forests and salt-marsh grass inhabited the lowland areas bordering the estuaries and lagoons. The continued rise in sea level from the glacier's melt-water drowned the marshes and lower elevations. The remaining island was subsequently eroded away by winds and waves accompanied by strong tidal currents which reduced the island to its present state as a shallow bank. (A technical account of this study was recently reported in an article by Emery, Wigley, and Rubin 1966.)

## FOSSIL TREE

A piece of silicified tree limb (fig. 4) was also dredged by the scalloper Ruth Lea from the same locality (western end of Georges Bank) where the peat was found. This specimen was originally about 18 inches long and 3 to 4 inches in cross section. The oxidized outer layer is white and has a somewhat flaky structure. This layer, absent in some places, has a maximum thickness of  $\frac{1}{4}$  inch. Contrasting sharply with the outer layer is a very dense, well-preserved inner portion that is gray with numerous closely spaced black streaks. These features are evident on the cross-section cut shown in the photograph. The gray-black inner portion is about as hard as marble.

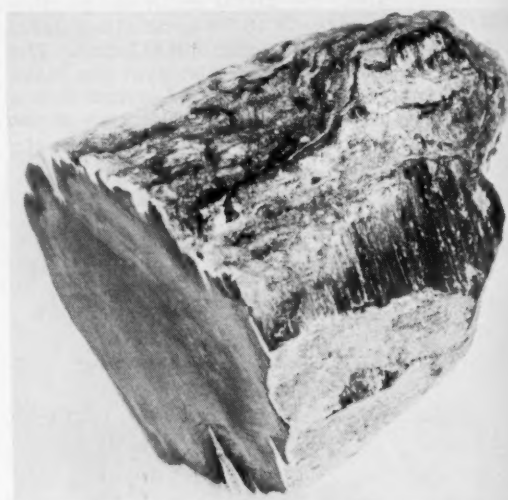


Fig. 4 - Oblique view of silicified portion of the tree *Euptelea*, an extinct species.

Dr. Richard A. Scott of the U. S. Geological Survey identified this specimen as a portion of a dicotyledonous tree, family Eupteleaceae, genus *Euptelea*. The species is new to science, and the Georges Bank specimen is the only record so far known. It is currently being studied by Dr. Scott. His research has revealed that the occurrence of the genus *Euptelea* off Massachusetts is the first record for this region of the United States and the second record of its occurrence in the New World. Two living relatives of this fossil species occur in Asia: one species lives in Japan, the other in China and India.

This tree is believed to have lived during the early part of the Tertiary Period, 40 to 75 million years ago, although an even older, late



Cretaceous age is possible. After it has been thoroughly analyzed, the specimen will be placed in the permanent paleobotanical collections of the U. S. National Museum in Washington, D. C.

### WALRUS TUSK

The fossilized anterior portion of a walrus skull (*Odobenus rosmarus*) with tusk attached (fig. 5) was found in April 1965 by Magnus Isaksen, master of the commercial fishing dragger *Aloha*. This specimen was discovered about 50 miles south of Long Island, New York—40°01.4' north latitude and 72°36.3' west longitude—at a depth of 32 fathoms. The tusk, a canine tooth from the upper jaw used by the walrus for grubbing mollusks and crustaceans from the ocean bottom, is 15 inches long and 3 inches wide. The outer surface of the tusk is roughened by uneven exfoliation of a few thin flakes from the sides.



Fig. 5 - Fossil walrus tusk attached to the anterior portion of the skull.

Walruses now inhabit the open waters of the Arctic Ocean around the edge of the polar ice, moving southward in winter. Although it presently does not migrate south of Labrador in eastern North America, the southernmost record for this species during historic times is Massachusetts (42° N. latitude). Judging from the fossilized condition of this specimen and the geographic location from which it was recovered, this walrus probably lived during the late Pleistocene Epoch, perhaps 20 to 50 thousand years ago.

### MAMMOTH TOOTH

A beautiful specimen of a fossil molar tooth (fig. 6) from a mammoth, tentatively identified as *Mammuthus jeffersoni*, was also collected by the *Aloha's* master. It was dredged June 29, 1965, during fishing operations 46 miles east of Cape Henry, Virginia. The position determined by Loran-A bearings is 36°51.5'



Fig. 6 - Oblique view of a fossil molar tooth from a mammoth (*Mammuthus jeffersoni*).

north latitude and 75°02.0' west longitude, at a depth of 19 fathoms (114 feet).

The mammoth tooth is 12½ inches long, 6 inches deep, about 2 to 5 inches wide, and weighs 7¾ pounds. It is widest near the middle and tapers toward each end. In cross section it is also widest midway between the top and bottom; the grinding surface and roots are narrower than the center portion. It is mostly dark brown mixed with various shades of gray. The tooth is in excellent condition. A few bryozoans occurring together near the anterior end were the only fouling organisms found living on this specimen. This limited growth indicates that, when collected, the tooth was probably buried in bottom sediments with only part of the anterior end exposed to water.

Now extinct, mammoths were large, elephant-like beasts with very long curved tusks turned upwards at the tip. They migrated to North America by way of the Alaskan-Siberian land bridge thousands of years ago. Because of their enormous body weight, they required vast quantities of food. In keeping with their dietary needs, their molar teeth were large and had broad, flattened crowns, well adapted to the grasses they ate.

Much remains to be learned about the mammoths that inhabited eastern North America. Bones, teeth, and other skeletal parts of these interesting creatures from offshore waters on the Atlantic Continental Shelf are exceedingly rare. The tooth shown in Fig. 6 is being studied by paleontologists at the Smithsonian Institution, Washington, D. C.

### PREHISTORIC MAN

Approximately 10,000 to 12,000 years ago, primitive human beings inhabited much of the United States and parts of Canada. Evidence of these early cultures stems largely from fluted projectile points interbedded with charcoal and animal bones (Haynes 1964). Clovis



man is believed to have established the earliest culture, followed in time by Folsom man. Sea level during this period was as much as several hundred feet below the present level. Consequently, large expanses of coastal plain--now the Continental Shelf--were available for habitation by man before this land was submerged. Corroborating evidence suggests that prehistoric man could have inhabited areas many miles beyond the present shoreline (Emery 1966). If coastal areas were inhabited by man 10 to 12 thousand years ago, we may find fluted projectile points, teeth, mollusk shells from "kitchen middens," animal bones,

or similar objects in what is now rather deep water, such as Georges Bank. Evidence of early human occupation of the offshore banks or other shelf areas would be exceedingly valuable to archaeologists in reconstructing the history of man.

Fishermen, marine scientists, and others whose occupation provides them with an opportunity to discover submarine fossils, are urged by the author to collect and send to scientific institutions objects similar to those illustrated or mentioned in this paper, including any unusual ones.

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#### It Could Send You To The Bottom

The most recent acquisition of Woods Hole's benthic staff was a large, yellow, cylindrical crystalline mass weighing about 20 pounds. It was proudly turned in as this year's \$64 question. It turned out to be TNT!

Since it had no paleontological value, it was turned over to the local Air Force explosives disposal unit.

Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.



# INTERNATIONAL

## U.S. and U.S.S.R.

### Discuss Fishery Problems

American and Soviet fishery experts concluded a week of technical discussions on July 30 devoted to problems of conservation and the use of fishery resources off the United States coast. The delegations agreed to recommend exchanges of personnel aboard fishing and research vessels in Atlantic and Pacific areas and suggested they begin within a month.

It was also recommended that the U.S.S.R. take action to ease problems produced by the concentration of vessels on fishing grounds customarily used by American fishermen--with immediate attention given to the area off Oregon and Washington. A recommendation was also made that there be no Soviet fishing within 12 miles of the Washington-Oregon Coast, except for research vessels. The Soviet delegation agreed that instructions would be issued to the Soviet fleet in this area repeating earlier instructions not to fish for salmon.

The conferees noted the conflict in the Shumagin Islands area where fishermen of the two nations are using different types of fishing gear. It was decided that the problem be handled within the framework of the existing agreement covering similar gear problems in the Kodiak area.

The experts recommended that scientists and technical experts meet in Moscow in mid-November to continue their work. (State Department.)



### International Pacific Halibut Commission

#### HALIBUT FISHING ENDS IN AREAS 1, 2, 3A, and 3B

The 1966 season for the main Pacific halibut fishing areas ended at 6:00 p.m., P.S.T., August 25 for Areas 1 and 2; August 15 for Area 3A; September 17 for Area 3B. The International Pacific Halibut Commission

announced the closure to coincide with the attainment of quotas: 23 million pounds for Area 2; 33 million pounds for 3A; and 3.5 million pounds for 3B. (Area 1 is not subject to quota.)

Areas 3C and 4D (in the vicinity of the Bering Sea) remained open until November 15, without catch limits. Area 4B was open only from September 1-10. The other northern fishing areas had only a spring season this year.

The 1966 season was 28 days shorter than 1965 in Area 2 and 19 days in Area 3A. The 1966 quota in 3A was down a million pounds from 1965; Area 2's quota was the same as 1965.

Fishing areas in 1966 were: Area 1--south of Willapa Bay, Washington; Area 2--between Willapa Bay and Cape Spencer, Alaska; Area 3A--between Cape Spencer and the Shumagin Islands; Area 3B--the Shumagin Islands to Atka Island, not including the Bering Sea; Area 3C--west of Atka Island, not including the Bering Sea; Area 4A--the Bering Sea edge, Unimak Pass to the Pribilof Islands; Area 4B--Fox Islands grounds, Bering Sea; Area 4C--between the Pribilof Islands and 175° W. longitude; Area 4D--east of 175° W. longitude and north of a line between St. Paul Island and Cape Newenham and waters of the Bering Sea west of 175° W. longitude; and Area 4E--the flats east of Area 4A and south of the Cape Newenham line.

Note: See *Commercial Fisheries Review*, April 1966 p. 50, Nov. 1965 p. 41.



### Fish Oil

#### WORLD EXPORTS SET RECORD IN 1965

The world's gross exports of fish oil (including fish-liver oil) set a record of 520,400 short tons in 1965--12 percent above revised 1964 total and slightly above previous high in 1963. The volume of exports was nearly 2½ times average annual exports in 1955-59. This indicates a rather rapid rate of expansion. Most of this expansion reflected increased output in Peru, Iceland, Norway, and

World Gross Exports of Fish Oil (Including Fish-Liver Oils)<sup>1/</sup>, Average 1955-59, Annual 1960-1965

Continent and Country	2/ 1965	1964	1963	1962	1961	1960	Average 1955-59
..... (1,000 Short Tons) .....							
<b>North America:</b>							
Canada .....	7.6	15.8	6.4	3.2	4.4	15.2	8.5
Mexico .....	.3	.5	.3	.3	.8	3/	.7
United States .....	51.9	75.7	131.2	61.5	61.2	71.8	64.1
Total .....	59.8	92.0	137.9	65.0	66.4	87.0	73.3
<b>South America:</b>							
Argentina .....	.4	.8	.5	.4	.6	1.0	.5
Chile .....	9.9	15.1	12.7	12.0	5.1	6.6	4/ .1
Peru .....	151.3	121.9	138.3	166.0	112.8	38.6	5.5
Total .....	161.6	137.8	151.5	178.4	118.5	46.2	6.0
<b>Europe:</b>							
Denmark .....	57.1	33.5	22.9	16.8	10.5	7.4	12.5
France .....	2.1	2.8	4.0	2.8	2.7	2.4	1.1
Germany, West .....	15.2	22.2	22.7	22.9	25.3	26.2	17.9
Iceland .....	97.6	68.6	71.2	72.5	35.2	54.5	21.1
Netherlands <sup>5/</sup> .....	1.7	2.7	2.8	2.6	5.2	7.8	10.4
Norway .....	59.4	22.3	21.2	18.6	24.0	18.4	21.3
Portugal .....	10.3	7.5	10.5	6.7	7.4	4.9	5.1
Sweden .....	3.3	4.0	3.4	2.0	3.4	2.5	2.5
United Kingdom .....	1.9	2.2	2.7	2.6	3.2	3.7	3.8
Others (incl. U.S.S.R.) <sup>2/</sup> .....	2.8	2.8	2.6	2.9	2.8	2.0	1.7
Total .....	251.4	168.6	164.0	150.4	119.7	129.8	97.4
<b>Africa:</b>							
Angola .....	5.2	8.1	3.4	2.9	3.3	7.3	8.1
Morocco .....	1.4	5.8	5.7	4.9	4.5	5.7	2.7
South Africa Republic <sup>6/</sup> .....	38.9	49.2	35.3	50.4	50.3	37.4	15.2
Total .....	45.5	63.1	44.4	58.2	58.1	50.4	26.0
<b>Asia and Oceania:</b>							
Japan .....	1.3	2.3	2.0	3.2	2.7	3.8	5.8
Others <sup>7/</sup> .....	.8	.8	.8	.7	.8	1.0	1.2
Total .....	2.1	3.1	2.8	3.9	3.5	4.8	7.0
<b>World Total</b> .....	<b>520.4</b>	<b>464.6</b>	<b>500.6</b>	<b>455.9</b>	<b>366.2</b>	<b>318.2</b>	<b>209.7</b>

1/Hardened fish oils have been included wherever separately classified in export statistics.

2/Preliminary.

3/Under 50 tons.

4/1959 only.

5/May include some whale oil prior to 1960.

6/Excludes sizable quantities of hardened fish oils exported annually, which are not separately classified in trade returns.

7/Includes estimates for minor exporting countries.

8/Including territory of South-West Africa.

Note: Does not include whale and other marine-mammal oils.

Source: U.S. Foreign Agricultural Service. Prepared or estimated on basis of official statistics of foreign governments, other foreign source materials, reports of U. S. Agricultural Attachés and Foreign Service Officers, results of office research, and related information.

Denmark; in aggregate, they accounted for about 70 percent of total exports, compared with less than 30 percent in 1955-59.

Exports from the United States, the world's leading supplier of fish oil prior to 1960, declined for the second consecutive year because of a reduced catch. In quantity, the 1965 exports were one-fifth below annual exports in 1955-59, and only about two-fifths the record 1963 exports.

According to customs data, Peru, the world's major producer and exporter of fish oil, expanded 1965 exports by nearly one-fourth--to 151,300 tons--the highest since 1962, when exports reached record 166,000 tons. The increase may have reduced stocks from high level of January 1965. Output in 1965 declined sharply from the record 1964

output estimated at 220,000 tons. (World Agriculture Production and Trade, U. S. Department of Agriculture.)



## Fish Meal

WORLD PRODUCTION ROSE 11%  
IN JANUARY-JULY

The world's production of fish meal in the first 7 months of 1966 increased about 11 percent from the same period in 1965. Output in 1966 was up sharply in Peru, Chile, and Norway.

Most of the principal producing countries submit data monthly to the International Association of Fish Meal Manufacturers (IAFMM) (see table).

Country	June	July	Jan.-July	
	1966	1966	1966	1965
	(Metric Tons)			
Canada	7,190	12,690	46,541	44,059
Denmark	15,554	10,265	60,825	65,446
France	1,100	1,100	7,700	7,700
German Fed. Repub.	5,187	6,006	41,758	38,161
Netherlands	1/	1/	2/1,510	3,375
Spain	1/	1/	1/	13,247
Sweden	422	196	2,070	4,482
United Kingdom	6,984	6,883	54,030	48,161
United States	30,540	29,449	3/95,452	131,480
Angola	2,982	1/	3/23,511	23,743
Iceland	19,134	15,812	76,450	67,689
Norway	56,972	45,528	277,627	189,789
Peru	5,922	506	969,397	892,653
So. Afr. (including S.-W. Afr.)	47,549	29,620	206,760	232,822
Belgium	375	375	2,625	2,625
Chile	19,698	17,675	153,147	47,142
Morocco	1/	1/	1/	7,900
Total	219,609	176,105	2,019,403	1,820,474
1/ Data not available.				
2/ Data available only for January-April 1966.				
3/ Revised.				
4/ Data available only for January-June 1966.				
Note: Japan does not report production to the IAFMM.				

\* \* \* \* \*

## FEO PRODUCTION AND EXPORTS

The member countries of the Fish Meal Exporters' Organization (FEO) which account for about 90 percent of world exports of fish meal, report a rise in production and a drop in exports during January-July 1966--compared to the same period in 1965. The FEO countries are Chile, Angola, Iceland, Norway, Peru, and South Africa/South-West Africa.

Table 1 - FEO Exports of Fish Meal, Jan.-July 1966

Country	July		Jan.-July	
	1966	1965	1966	1965
	(1,000 Metric Tons)			
Chile	25.8	1.0	117.0	51.3
Angola	1/	2.8	2/ 22.7	27.2
Iceland	16.0	14.7	81.3	64.2
Norway	17.7	24.6	129.6	117.3
Peru	111.0	110.3	858.3	1,029.5
So. Africa (including S.-W. Africa)	15.7	20.2	89.7	132.7
Total	186.2	173.6	1,298.6	1,422.2

Table 2 - FEO Production of Fish Meal, Jan.-July 1966

Country	July		Jan.-July	
	1966	1965	1966	1965
	(1,000 Metric Tons)			
Chile	17.7	2.2	153.1	47.1
Angola	1/	3.0	2/ 23.5	23.7
Iceland	15.8	14.0	76.5	67.7
Norway	45.5	46.2	277.6	189.8
Peru	0.5	12.4	969.4	892.7
So. Africa (including S.-W. Africa)	29.6	39.4	206.4	231.6
Total	109.1	117.2	1,706.5	1,452.6
1/ Data not available.				
2/ Data available only for Jan.-June 1966.				



## Oceanography

## "OCEANOGRAPHER" SAILS ON 14,000-MILE EXPEDITION

The "floating laboratory" of the U. S. Coast and Geodetic Survey, the Oceanographer, sailed from Jacksonville, Fla., October 3, for an 11-week, 14,000-mile scientific expedition to the South Atlantic.

The 303-foot, 3,800-ton, \$9.2 million air-conditioned vessel is the largest and most completely automated oceanographic research vessel in the United States. It will conduct a wide range of marine scientific studies off the east coast of South America and participate in observations of a total eclipse of the sun on November 12.



Oceanographic track of the trip of the Oceanographer which was designated "Operation Eclipse".

The expedition's objectives are to make a scientific observation of the total eclipse and conduct research along the continental margins of Brazil, Uruguay, and Argentina. South American scientists were invited to participate in various phases of the expedition. The Oceanographer will seek evidence to evaluate the suggestion that the earth's continents were once part of one or two supercontinents that split aeons ago and have been adrift since. Its work may shed light on the idea that South America and Africa were once one continent.

The studies will determine the topography of continental shelf and slope in this area and the nature of the ocean's subbottom. Measurements of the earth's magnetic and gravitational forces will be conducted as an aid to understanding earth's crust. Bottom samples will be taken to study the nature of the sea floor.

The Oceanographer was scheduled to reach Buenos Aires on November 6 and prepare for the solar eclipse. It will be stationed directly in the path of the total eclipse, about 200 miles east of Buenos Aires and 150 miles off the Argentine coast. During the 2-minute total eclipse, an effort will be made to determine whether the ocean's deep scattering layer can be detected.



### Joint Coral Sea Survey Under Way

The Royal Australian Naval Experimental Laboratory and the U. S. Naval Oceanographic Office are participating in a year-long oceanographic survey operation in the Coral Sea.



### Study Earth's Magnetic Field

The U.S. Naval Oceanographic Office (NOO) is conducting an airborne geomagnetic survey--called Project Magnet--of all accessible ocean areas of the world. Geophysicists have long sought greater knowledge of the earth's magnetic field. A NOO plane left in early October on a 44-day round-the-world trip.



### Mariners Warned of Dangers in Commercial Fishing Techniques

The expansion of the world's fishing fleets and the development of complex harvesting techniques pose new dangers to ship and boat owners, warns the October 1966 Pilot Chart of the U. S. Naval Oceanographic Office.

A danger facing a maritime watch officer or pleasure boat owner is the offshore fishing line that runs up to 15 miles or more. Although glass-buoyed float lines and marker pennants are generally used, an unwary mariner might foul his propeller in the extensive gear.

In coastal waters, natural estuaries, inlets and rivers, watch officers should be alert to dangers presented by weirs, pound nets, and fish traps, the publication advises.



### SEDIMENTATION MAY TRANSFORM GULF OF MEXICO INTO A CONTINENT

"Some of the world's small ocean basins (such as the Gulf of Mexico, the Bering Sea, the Sea of Okhotsk, and the western Mediterranean Sea) may eventually become so filled with sediment that they become continents," said H. W. Menard, Office of Science and Technology, Executive Office of the President, of the annual meeting of the American Geophysical Union in Washington, D. C.

These basins have only small areas, but they contain nearly as much sediment as the enormous basins of the world and a far greater volume of sediment than the deep-sea trenches. Thick layers of sediment and sedimentary rock accumulate on the oceanic crustal bottom to depths of more than six miles. If sedimentation continues, these basins will fill up eventually and become part of the continents. (Reprinted, with permission from *Science News*, weekly summary of current science, c 1966 by Science Service, Inc.)



# FOREIGN

## EUROPE

### European Economic Community

#### FISHERIES POLICY DRAFTED

The European Economic Community (EEC), faced with a mounting bill for fish imports, has drafted a common fisheries policy to enable the fishermen of their member nations to increase production. The catch by EEC fishermen has remained relatively unchanged at 2 million tons per year, while world output has increased markedly. EEC imports of fishery products in 1963 were about \$195 million.

The draft proposal would harmonize support systems of member nations for their commercial fishing industries; stabilize their fishermen's income; establish uniform marketing regulations and quality standards; and create a framework for modernizing the fishing fleets. Fishermen displaced by automation would be retrained. The overall policy would resemble policies for the agriculture sector of EEC economies: using price supports and intercommunity levies until desired prices are realized.



### European Free Trade Association

#### ITS CATCH IS 2½ TIMES EEC'S

Over 5 million metric tons of fish were landed in 1965 by countries of the European Free Trade Association: Denmark, Norway, Portugal, Sweden, United Kingdom, Switzerland, and Austria. Per-capita consumption averages 26.5 pounds a year. In the European Economic Community, the annual total catch is about 2 million tons; per-capita consumption is about 13 pounds.

The main fishing grounds of the EFTA countries are the coastal and international waters of the North Atlantic area.

Cod and herring account for most of the fish caught. The former, and related species such as hake and haddock, are particularly

important to Britain (two-thirds of the total catch), to Norway and Portugal, and to Greenland and the Faroe Islands.

The herring catch is less evenly distributed. It accounts for only a small part of the British landings, but it is of great importance to the Nordic countries. Sardines, classified with herring, are traditionally important for Portuguese exports, but their share in the total Portuguese catch has fallen since 1940.

Fish other than the cod and herring groups are gradually becoming more important because they are generally of greater value. The present healthy position of the Danish fishing industry owes much to its production of trout, plaice, Atlantic salmon, and shellfish, all of which bring good prices.

The countries that catch most fish are also those that eat the most. This is partly tradition, and partly the natural result of geography and economics. Only recently, with the rise of quick-freezing, has it become possible to provide ocean fish in good condition to inland markets, and even now good fish are cheapest near fishing ports. An average of 40 pounds of fish a year is consumed by each citizen of Norway, Sweden, and Portugal; Icelanders eat more. Denmark, Finland, and the United Kingdom are somewhat less enthusiastic, but still eat much more than the non-EFTA European average. Consumption in Austria and Switzerland, although rising rapidly with the development of cold-distribution systems, remains low at about 8 pounds a year.

#### Exports and Imports Balance

In most years, EFTA exports and imports of fish are roughly in balance at \$350-400 million. There is significant trade among EFTA nations themselves. Since fishing vessels of one EFTA country frequently land catches in another, the trade is sometimes in both directions; for example, between Denmark and Sweden.

Exports of fish are of special importance to three EFTA countries: Norway, Portugal, and Denmark. Norway until recently accounted regularly for half or more of total EFTA exports of fish; now it is responsible for a little

## EFTA (Contd.):

over two-fifths; her fishery export earnings of \$156 million in 1964 were about 13 percent of total exports. For Portugal, fish sales abroad earned \$49 million or 10 percent of her total exports. For Denmark, the figures were \$100 million and 5 percent, respectively. Britain and Sweden, each with total exports of about \$26 million in 1964, are the only other EFTA exporters of significance.

About 40 percent of total EFTA exports of fish are either fresh or frozen. Exports of fresh or frozen fish—and especially fish fillets—more than doubled in value between 1948 and 1964, rising from \$68 million to \$156 million.

Exports of salted, dried, and smoked fish have fallen substantially since World War II. Most such exports are shipped from Norway, which still finds its traditional market for dried and salted cod in Portugal, Brazil, Italy, and Spain. More important today are exports of canned fish. Portugal accounts for about 50 percent of the EFTA total (mostly sardines, anchovies, mackerel and tuna) and Norway 30 percent (mostly canned herring and sprat). Norway also earns substantial sums from exports of fish meal and marine oil.

Three-fifths of all EFTA imports of fish and fish products go to the British market. Sweden comes next, but far behind Britain, with 11 percent. Denmark and Switzerland each imports about 6-7 percent of the EFTA total. Somewhat less than half of Britain's total imports of fish are bought from her EFTA partners; Norway and Denmark are in roughly equal position as the main suppliers. (EFTA Reporter, August 8, 1966.)



## Denmark

## 1968 INTERNATIONAL FISHERIES FAIR PLANNED

The Danish fishing industry is sponsoring the Sixth International Fisheries Trade Fair, which will be held in Esbjerg, April 24-May 5, 1968. Scheduled originally for Copenhagen in 1967, plans for the fair were changed so that it could be tied in with the centenary of the fisheries harbor in Esbjerg.

The recently constructed Exhibition Hall in Esbjerg will provide an area of 8,000 square meters to display the latest developments in fishing and processing equipment. Modern fishing vessels can be shown in the harbor.

Denmark's Fifth International Fisheries Trade held in Copenhagen, September 1964, attracted 200 exhibitors from 14 countries. It is expected that the European fishing industry will be well represented at Esbjerg in 1968.

Note: See Commercial Fisheries Review, Dec. 1964 p. 91.



## Soviet Union

## FISHES FOR TUNA IN INDIAN OCEAN

The tuna factory mothership Svetlii Luch departed the fishing base on Shikotan Island at the end of August 1966 for several months of fishing in the Indian Ocean. Its first stop was in the southern Kuril Islands (where a large Soviet fishing fleet catches Pacific saury) to obtain bait. It is seeking tuna and, for the first time, squid.

The Luch was bought from Japan in 1965, with 4 other identical vessels, for about US\$20 million. The terms were 30 percent down, and the rest in semiannual payments of 5 percent of the total price. The Luch-class has a capacity of about 5,300 gross tons and accommodations for a crew of 180. It is 115 meters (377 feet) long and can operate for about 4 months without resupplying. (Additional technical details available on request.) She went on maiden cruise to the tropical Pacific in May 1965 for 4-5 months. The second trip began in October 1965 and ended in early April 1966. During that voyage, about 400 metric tons of tuna were caught and canned.

Canned tuna, costing 0.80 rubles (\$0.89) for a 7-oz. can, is prominently displayed in Moscow fishery products stores.

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## RESEARCH VESSELS ARE ACTIVE

Two TINRO research vessels, the Adler and the Iskatel', returned to Vladivostok in late August and early September, and two others sailed from the port on research mis-

## Soviet Union (Contd.):

sions. TINRO is the Pacific Scientific Institute for Fisheries and Oceanography. From about February 1966, the Adler studied fishery resources and their potential off U. S. and Mexican Pacific coasts. Crisscrossing the eastern Pacific between Vancouver, B.C., and Baja California, she used the former as a port of call for supplies until the Canadian Government enforced existing regulations prohibiting a foreign vessel with fishing gear aboard from entering her ports except in emergencies.

Early in 1966, the Iskatel' found large anchovy resources off the Mexican and U. S. coasts. She then went on a 2-month expedition to the Aleutian Islands, where she explored for Pacific ocean perch stocks and studied the biology of Alaska pollock and sablefish.

Leaving Vladivostok when the 2 TINRO vessels returned were the Akademik Berg, flagship of the Pacific fishery research fleet, a recently built large stern freezer trawler. Her destination was the central Bering Sea to study deep-water stocks of halibut and sablefish. She will trawl for those species at 400-1,500 meters (1,200-4,500 feet). A second vessel, the Seskar, replaced the Iskatel' in searching for ocean perch, sablefish, and halibut in an unspecified area off the U. S. Alaskan coast.

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## STUDIES PACIFIC SAURY

During February-October 1965, the research vessel Ogon of the Pacific Scientific Institute for Fisheries and Oceanography (TINRO) studied the distribution of saury stocks off the Pacific Northwest. No commercial-size stocks were observed during June-July. But from August to October, the saury occupied a 13,000-square-mile area about 50-70 miles off U. S. coasts. Sometimes they stretched to a maximum length of 450 miles, from northern Washington to Eureka in northern California, or between 41° and 48° N. latitude--and to a maximum width of 150 miles. The distribution was irregular; most dense concentrations were noted between 42°18' and 44°22' N. latitude or off southern Oregon, where the size of fish averaged 26 to 30 cm. (10 to 11 inches) and weighed 100 grams (3.53 lbs.) each. North of that area, saury concentrations were less dense; south of the area, the size was much smaller (18-22 cm. or 7-9 inches).

According to Soviet scientists, saury assemble off the Pacific Northwest to feed and spawn in August, and probably remain until November. (Rybnoe Khoziaistvo, No. 7, 1966, pp. 20-21.)

The TINRO fishery research vessel Krym left Vladivostok in mid-September 1966 on a 3-month cruise. Her scientists will study the biology of the Pacific saury during their winter migrations.

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## DEVELOPS NEW OCEAN PERCH FISHERY

In August, the Soviet Far Eastern Fisheries Administration began to fish for Pacific ocean perch off the North Kuril Islands (south of Paramushir Island). This fishery is still in an experimental stage and only 1 or 2 Sakhalin large stern freezer trawlers are fishing there. Average daily catches run about 50 metric tons; the highest daily catch exceeded 70 tons. Other vessels will probably be sent to the area. Because the size of the resource is not known, it is not known how many vessels it will support.



## East Germany

## EXPANDS HER FISHERIES

In mid-September, the factory stern trawler ROS 312-Bodo Uhse which had been operating on Georges Bank was joined by another large stern trawler. (Ostsee-Zeitung, August 31, 1966.) This is the first time since 1962 that East Germans have fished on Georges Bank. In 1962, 3 large factory trawlers were sighted in September-December, and 10 medium trawlers in June. East Germany's ICNAF fishery is traditionally conducted south of Greenland, in the Labrador Sea, and off Newfoundland. Along with their advance to the south in the Northwest Atlantic, they began to fish off South-West Africa in the eastern Atlantic. One factory trawler, ROS 311-Rudolf Leonhard was reported fishing in Walvis Bay in early September 1966. At the same time, the research vessel Ernst Haeckel was conducting studies in the South Atlantic.

East Germany is the last East European nation to expand her traditional post-World War II fishing grounds. Commercial Fisheries Review has reported the previous expansion of

## East Germany (Contd.):

fishing effort, mostly in the Atlantic, of Romania, Bulgaria, Poland, Yugoslavia, and the Soviet Union. Except for Yugoslavia, other East European nations coordinate their research and operational plans very closely with the U.S.S.R.

There are many reasons for the late entry of East Germany in this race to southern fishing grounds. Most important is that immediately after the war the East Germans were persuaded by the Soviets to construct fishing vessels for their fleet. A large portion of the initial Soviet high-seas fleet--hundreds of medium side trawlers in the SRT and SRT-R classes--were built in East German shipyards. East Germany herself has no more than about 50-60 medium trawlers ranging from 260 to 940 gross tons. She has only 1 or 2 modern (1964-1965) base ships in addition to 2 older ones (1950 and 1956).

In the early 1960s, construction of large factory stern trawlers began in the Wismar and Stralsund shipyards. The Wismar-built, 3,000-gross-ton Bertold Brecht class was constructed for the East German fishing fleet; the Stralsund 2,600-gross-ton Tropik class for the Soviets. By 1966, over 60 Tropiks were delivered to the Soviets and only about 15 Bertold Brechts to the domestic fleet. These largely self-sufficient factory trawlers, however, make it possible now for East Germany to extend her high-seas fishing operations to greater distances.



## Iceland

## REPORTS FISHERY LANDINGS AND HOW USED, JANUARY-MARCH 1965 and 1966

Species	Jan.-Mar.	
	1966	1965
	..... (Metric Tons) .....	
Cod . . . . .	73,249	80,659
Haddock . . . . .	8,669	21,123
Saithe . . . . .	5,968	12,007
Ling . . . . .	1,520	2,100
Wolfish (catfish) . . . . .	3,821	3,140
Cusk . . . . .	948	1,145
Ocean perch . . . . .	2,468	4,634
Halibut . . . . .	154	175
Herring . . . . .	17,394	48,815
Capelin . . . . .	123,742	48,797
Shrimp . . . . .	721	394
Other . . . . .	1,289	742
Total . . . . .	239,943	223,731

Note: Except for herring, which are landed round, all fish are drawn weight.

How Utilized	Jan.-Mar.	
	1966	1965
	..... (Metric Tons) .....	
Herring and Capelin <sup>1/</sup> for:		
Oil and meal . . . . .	135,814	82,955
Freezing . . . . .	2,919	10,973
Salting . . . . .	1,452	3,137
Fresh on ice . . . . .	937	546
Groundfish <sup>2/</sup> for:		
Fresh on ice . . . . .	10,033	12,833
Freezing and filleting . . . . .	40,274	54,682
Salting . . . . .	25,603	34,297
Stockfish (dried unsalted) . . . . .	18,416	19,758
Canning . . . . .	2	17
Oil and meal . . . . .	484	493
Crustaceans for:		
Freezing . . . . .	710	303
Canning . . . . .	11	91
Home consumption . . . . .	3,273	3,645
1/Whole fish.		
2/Drawn fish.		

Source: Aeqir, June 1966.



## Italy

## INDUSTRY SEEKS RISE IN DUTY-FREE QUOTA OF FROZEN TUNA

The tuna industry has asked the government to begin negotiations immediately to have present restrictions on frozen tuna imports liberalized. In 1965, following negotiations at Brussels with other EEC nations, Italy was permitted to import from non-EEC countries 14,000 metric tons of frozen tuna duty free, assess an ad valorem duty of 0.5 percent for imports between 14,000-40,000 metric tons, and 15 percent over 40,000 tons.

Beginning in 1970, under the Treaty of Rome, Italy will adopt a common external tariff policy. At that time, under the Common Market tariff schedule, she will be permitted to import 14,000 tons of tuna duty free--but must assess an ad valorem duty of 35 percent for imports exceeding that amount. That high tariff is expected to seriously hurt the canned tuna industry, which presently imports annually about 40,000 tons of tuna, mostly from Japan. For this reason, the industry seeks to have the 14,000-ton duty-free quota raised to 40,000 tons. (*Nihon Suisan Shim-bun*, September 5, 1966.)





## Norway

### CANNED FISH EXPORTS REPORTED FOR JANUARY 1-JULY 16, 1966

As of mid-July, exports of canned brisling in 1966 were running about 13 percent higher than in the same period of 1965, but shipments of canned sild were down due to a disappointing pack. Exports of canned kippered herring also declined slightly while exports of soft herring roe went up substantially. The United States and Great Britain are Norway's leading markets for canned brisling and sardines.

Exports of Principal Canned Fishery Products,  
January 1-July 16, 1966

Products	Jan. 1-July 16, 1966	Jan. 1-July 17, 1965
	... (1,000 Standard Cases 1/7) ...	
Brisling. . . . .	236	208
Sild sardines . . . . .	392	442
Kippered herring . . . . .	141	148
Soft herring roe . . . . .	60	43
1/Cases of 48 1/4 cans.		

In mid-July 1966, small sild for canning was in very short supply; brisling landings were good. (Norwegian Cannery Export Journal, Aug. 1966.)



## Romania

### TRAWLER RETURNS FROM NORTHWEST ATLANTIC

The Galati has returned from fishing on Georges Bank off New England. The trip lasted from May 17 to August 23; 54 of the 99 days were spent fishing. The total catch was about 2,000 metric tons (species not specified). The crew of about 100 averaged 8-10 hours of fishing a day. The record catch was 40 tons a day and catches of 30 tons a day were not uncommon. (The Galati is one of 2 large stern freezer trawlers bought in Japan 2 years ago.) (U. S. Embassy, Bucharest, September 9, 1966.)



## ASIA

### Japan

#### FISHERMEN SEEK 12-MILE ZONE

Disturbed by increasing foreign competition in recent years, the fishermen of Hokkaido now are seeking to establish an exclusive fishing zone beyond the 3-mile territorial sea limit. They blame the increased operations of Soviet saury fleets off northern Japan and of South Korean vessels off Hokkaido which use Japanese ports to unload their catches.

Supported by the Hokkaido Prefectural Assembly Fisheries Committee, the fishermen are preparing to launch a vigorous movement to unify Japanese views toward establishing a 12-mile exclusive fishing zone. They claim it is necessary because foreign vessels are threatening to ravage coastal fishery resources, disrupt orderly fishing, and may destroy Hokkaido's fishery economy. Faced with this pressure, the Government, despite its traditional adherence to the 3-mile concept, may need to reevaluate its policy. (Suisan Keizai Shimbun, September 15, 1966, and other sources.)

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#### TRAWLER COMMITTEE PROPOSES EXPLORATION OFF U.S. EAST COAST

The Japanese Overseas Trawler Association was expected to review the recommendations of its study committee that selected the most promising fishing grounds not now exploited by Japan. The committee reportedly agreed on September 16 that priority be given to surveying the Atlantic grounds off North and South America because they held the greatest potential. It noted the Soviet fleet's operation off northeastern United States as indicating the possible potential of such resources as codlike fish and other deep-swimming species in nearby waters.

The Association's members recently agreed to pool resources to conduct explorations for new fishing grounds. The Association is expected to select a suitable 1,000-ton trawler for the survey from one of its member firms. (Suisan Keizai Shimbun, September 19, 1966.)

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## Japan (Contd.):

JOINT WHALE SURVEY  
IN ANTARCTIC PLANNED

The three whaling companies have agreed to cooperate in a joint survey of the Antarctic Ocean whale resources. They plan to send the 750-ton Chiyoda Maru No. 5 to grounds not previously explored or exploited to study the abundance of fin and sei whales. One objective reportedly is to determine the reliability of whale stock assessments.

According to scientists, the whale stocks are being seriously depleted and face extinction if not protected. Based on their findings, the international whale catch quota has been reduced over the years. For the 21st Antarctic whaling season, December 1966-April 1967, the quota was slashed by 1,000 blue-whale units (BWU), from 4,500 BWUs to 3,500 BWUs. Following a September meeting in Tokyo to discuss quotas, the three active nations, Japan, Norway, and the Soviet Union, reached a provisional one-year accord on quotas: Japan--1,633 (46.66 percent); Soviet Union--1,067 (30.48 percent), and Norway--800 (22.86 percent).

The Japanese press reported that the Japanese whaling industry feels that present stock assessments, based only on catch data, may not necessarily be correct because there may exist unexploited resources. If unexploited resources are found by the survey vessel, it would mean that the assessment of stock conditions should be reevaluated.

The Chiyoda Maru was scheduled to depart Yokohama November 18 and conduct the survey from December 11, 1966 to March 20, 1967. Principal grounds are Area 3 East and Areas 5 and 6. (Suisan Keizai Shimbun, September 12, 1966, and other sources.)

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EXPLORES FOR SALMON IN  
CHUKCHI SEA WITH POOR RESULTS

The 200-ton Japanese fishing vessel Dairin Maru No. 8, sent to the Chukchi Sea this summer to explore for salmon, returned to Tokyo September 4 after an 80-day trip. Fifty-two days were spent on the fishing grounds. She gill-netted about 25,000 salmon,

almost all chums, averaging 3.2 kilograms (7 lbs.) per fish. The total catch was about 80 metric tons (176,000 lbs.). Most of the catch was salted; six tons were frozen. The catch per shackle of net ranged from 0.1-1.5 fish, with average of 0.8.

Because of the Arctic nights--darkness did not set in--it was difficult to select best time to set and retrieve gear. Fishing in unfamiliar waters during only slightly over 50 days, personnel were not able to clearly determine salmon migration routes and sea conditions and got only a rough picture of conditions on the fishing grounds.

The Japanese firm was reported to have suffered a fairly large financial loss but intends to send a vessel to the Chukchi Sea again next year. It plans to study this year's data carefully and compare them with salmon landings made at nearby Alaskan shore installations--to determine relations, if any, to timing of the runs and migration routes. (Suisan Tsushin, September 17, 1966.)

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## SET NEW EXPORT PRICES FOR SALMON

The Japan Canned Salmon-Crab Sales Company announced on September 16 new export prices for canned "tidbit" red, silver, and king salmon:

Product	Can and Case Size	Price/Case for Shipments to:			
		Europe <sup>1</sup> /		Australia <sup>2</sup> /	
		New	Old	New	Old
		.... (US\$) ....		(Shillings/Pence) <sup>3</sup>	
Red . . .	$\frac{1}{2}$ -lb. 48's	16.65	16.25	123	121/3
Red . . .	$\frac{1}{4}$ -lb. 96's	21.20	20.80	156	153
Red . . .	$\frac{1}{4}$ -lb. 48's	10.75	10.55	79/3	77/9
Silver . .	$\frac{1}{2}$ -lb. 48's	14.75	13.35	109/6	99/6
King . . .	$\frac{1}{2}$ -lb. 48's	14.25	12.80	105/9	95/9

<sup>1</sup>/F.o.b. price. Excludes shipments to United Kingdom.  
<sup>2</sup>/C. & f. price.  
<sup>3</sup>/One shilling = 12 pence = approx. US\$0.14. One pence = US\$0.0117.

Shipments must be loaded on board carriers by December 31, 1966. However, trading firms contracting for over 10,000 cases of "tidbit" reds will have until February 28, 1967, to ship their products--but must ship over 70 percent of their contracted quantities by December 31. The last day for submitting buy offers was September 26.

## Japan (Contd.):

Completion of the coming sale is expected to just about clean out this year's pack. (Suisan Tsushin, September 19, 1966.)

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FISHERY RELATIONS WITH  
SOUTH KOREA MAY BE REEXAMINED

The advance of South Korea into the North Pacific salmon and trawl fishery and the recent entry of her vessels into Japanese ports to unload catches have reportedly strengthened the view of Japanese fishery circles that the government should reexamine its thinking about South Korea's expansion program. The program is based largely on Japanese assistance. They maintain the Government's curb on port entry by South Korean vessels is only temporary and will not effectively check the expansion.

A trade journal editorial noted disunity in the industry, the absence of long-range planning concerning South Korea, and urged formulation of a basic long-term policy to regulate vessel and gear exports, imports of fishery products from South Korea, and creation of joint ventures with her.

The Japanese Embassy in Seoul reported that South Korea's present fleet numbers about 50,000 vessels totaling 190,000 gross tons. Of these, about 7,000 vessels (14 percent) are motorized; the remaining 86 percent are unpowered craft. Vessels under 5 gross tons comprise 86 percent of the fleet; 67 percent are under 2 tons.

South Korea, with Japan's aid, plans to increase tonnage within next five years by about 100,000 gross tons to 300,000 tons. Japanese interests fear this would inevitably lead to competition in offshore fisheries. (Minato Shimbun, September 13, 1966, and other sources.)

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PLANS TO BUILD FLOATING  
SUPPLY BASE FOR TUNA FLEET

The Japan National Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN) is planning to construct a 1,600-gross-ton "floating supply base" to provide fuel, provisions, and medical serv-

ice to tuna vessels at sea. Now in the blueprint stage, the vessel will cost about 280 million yen (US\$777,778) and have a 21-man crew, plus accommodations for 2 NIKKATSUREN representatives, 1 doctor, and 2 patients. It is scheduled to begin operations in 1968, initially in the eastern Pacific Ocean.

This venture is another attempt by the Federation to improve management of tuna vessel operations to offset growing trend among coastal fishing countries to extend fishing zones and restrict use of ports. In 1963 and 1964, NIKKATSUREN successfully operated chartered tankers to conduct high-seas refueling operations in the Pacific Ocean. (Suisan Keizai Shimbun, September 15, 1966, and other sources.)

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## FROZEN TUNA EXPORT PRICES UP

The Japanese frozen tuna export market was becoming firm in mid-September 1966--compared to preceding weeks--with prices for both yellowfin and albacore up about \$30 a short ton. Trading firms contracted for delivery of frozen tuna to California at the following prices: yellowfin, gilled and gutted US\$470-475 a short ton c.i.f.; albacore, round \$520 a short ton c.i.f. (Suisan Tsushin, Sept. 30, 1966.)

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CANNED MACKEREL EXPORTS,  
JANUARY-JULY 1966

During January-July 1966, the equivalent of 67,203 cases of 1-lb. tall 48's, natural, and 1,068,556 cases of  $\frac{1}{2}$ -lb. 48's (Japanese can size--flat No. 2 48's), other than natural, were cleared for export, according to the Ministry of Finance. In first-half 1965, exports of 1-lb. tall natural totaled 400,999 cases, and of  $\frac{1}{2}$ -lb. other than natural 418,507 cases. Of total exports, the equivalent of 3,219 cases of 1-lb. tall natural, and 14,003 cases of  $\frac{1}{2}$ -lb. other than natural, were exported to the United States. (Suisan Tsushin, September 13, 1966.)



## Communist China

### NEW RESEARCH VESSEL BUILT

Communist China's first marine research vessel was built early in 1966. The 2,500-gross-ton vessel Tung Fang Hung ("East is Red") is equipped for biological, hydrological, meteorological, geological, physical, and chemical marine research. She has specialized laboratories and modern oceanographic equipment.

The Chinese have entered the tuna fisheries with a vessel bought from Japan. They have begun whaling with a specialized vessel built at home. It is also reported that a plant for manufacturing echo-sounders is in operation.

Though available data are sketchy and hard to interpret, there is little doubt that Communist China's high-seas fisheries are in the take-off stage of development. They are about where the Soviet fisheries were in early 1950s.



## South Korea

### SETS UP MARINE PRODUCTS OFFICE

The Ministry of Agriculture and Forestry showed the nation's interest in promoting fishing interests by elevating the former Fisheries Bureau to a semiautonomous Office of Marine Products. The new office is headed by O Chong-kun, who was given vice ministerial rank. The former bureau had 6 sections; the new office has 3 bureaus (10 sections) and an office of planning. (U.S. Embassy, Seoul, September 2, 1966.)



## North Vietnam

### FISHERMEN TRAIN IN U.S.S.R.

On or about August 22, 1966, North Vietnamese fishery students arrived at Nakhodka, the largest fishing port in the Soviet Far East, to study modern fishing techniques and processing technology. The visit may be related to increased technical aid recently promised North Vietnam by the Soviet Government. In

early 1966, the Soviets delivered 3 medium freezer trawlers under the U.S.S.R.-North Vietnam technical assistance program.



## CANADA

### FIRST-HALF 1966 LANDINGS ARE DOWN BUT VALUE IS UP

Landings during first-half 1966 totaled 808.2 million pounds valued at C\$52.2 million, compared with 834.2 million pounds worth C\$51.2 million during the same period of 1965.

Sea fisheries landings (including Newfoundland) during June 1966 amounted to 242.2 million pounds, an ex-vessel value of C\$18.6 million compared to 238.0 million pounds valued at C\$19.1 million in June 1965. The figures come from the June 1966 "Monthly Review of Canadian Fisheries Statistics."

Landings and ex-vessel values of principal species were:

Species	June			
	1966	1965	1966	1965
	Landings		Value	
	. (1,000 Lbs.)		. (1,000 C\$)	
<b>Atlantic Coast:</b>				
Cod .....	87,443	83,047	3,709	3,228
Haddock .....	6,688	6,170	478	419
Pollock .....	2,989	5,044	119	182
Flounder and sole ..	24,639	27,286	800	884
Herring .....	28,870	25,810	471	344
Swordfish .....	217	800	117	336
Lobsters .....	7,320	10,932	4,151	6,580
Scallops .....	1,528	1,772	578	981
<b>Pacific Coast:</b>				
Halibut .....	8,210	6,547	2,890	2,126
Herring .....	18,579	19,539	307	262
Salmon .....	5,716	3,679	2,383	1,596

Species	Jan.-June			
	1966	1965	1966	1965
	Landings		Value	
	. (1,000 Lbs.)		. (1,000 C\$)	
<b>Atlantic Coast:</b>				
Cod .....	219,877	208,093	9,764	8,273
Haddock .....	65,085	51,892	4,648	3,399
Pollock .....	18,353	26,346	723	925
Flounder and sole ..	88,874	75,356	3,016	2,505
Herring .....	108,066	93,025	1,500	1,178
Swordfish .....	627	1,346	378	613
Lobsters .....	20,127	23,489	11,754	14,789
Scallops .....	7,527	6,751	2,906	3,845
<b>Pacific Coast:</b>				
Halibut .....	14,929	15,619	5,145	4,747
Herring .....	137,517	221,205	2,299	2,904
Salmon .....	7,510	5,384	3,290	2,487

Canada (Contd.):

#### NEWFOUNDLAND BAIT SERVICE EXPANDS

The Newfoundland Bait Service is being further improved by the extension of refrigerated bait storage facilities to serve areas requiring this service, the consolidation of existing storage units, and revised prices. The Bait Service, provided by the Federal Government under terms of Newfoundland's

1949 union with Canada, supplies bait to fishermen in areas not adequately served by private enterprise. The service supplies Newfoundland and Labrador fishermen with close to 5 million pounds of bait annually through 19 depots and 38 holding units, 8 of which are going into operation for the first time this year. The government also operates the Arctica, which delivers bait supplies from depots to units in fishing areas.



#### DIET TRICKS WITH FISH STICKS

It takes no special tricks to fix fish sticks. Just follow the simple directions on the package. There's no trick to getting your family to eat them either; fish sticks have been an American favorite for years. The trick comes when you top piping hot fish sticks with a cold caper sauce to present a dieter's dream. Four fish sticks with a generous serving of this different, easy-to-do topping amount to about 240 calories.



This quick-fix seafood slimmer, Fish Caper, will delight the dieter, fascinate the fastidious, and haul in a netful of compliments for the clever cook.

Fish Caper is from a new, 16 page, full-color, diet booklet just released by the United States Department of the Interior's Bureau of Commercial Fisheries. This publication, Seafood Slimmers, is available for 25¢ from the Superintendent of Documents, Washington, D. C. 20402.

#### FISH CAPER

24 frozen fried fish sticks

Caper Sauce

( $\frac{3}{4}$  to  $1\frac{1}{4}$  ounces each)

Place frozen fried fish sticks in a single layer on a greased cookie sheet, 15 x 12 inches. Bake in a hot oven, 400° F., for 15 to 20 minutes or until heated through and crisp. Serve with Caper Sauce. Serves 6.

#### Caper Sauce

1 cup yogurt  
2 tablespoons chopped capers  
1 tablespoon lemon juice

1 tablespoon chopped parsley  
2 teaspoons instant minced onion  
1 teaspoon grated lemon rind

Combine all ingredients and mix thoroughly. Chill. Makes approximately  $1\frac{1}{4}$  cups of sauce.



## LATIN & SOUTH AMERICA

### Mexico

#### SHRIMP PRODUCTION IMPROVES

Shrimp production continued at good level during second quarter of 1966. Although the catches in May and June 1966 were slightly below those months in 1965, landings in April were so much greater than last April's that they brought the quarter's total up to 7.1 percent above 1965. Following the 4.3-percent increase over 1965 during the first quarter, 1966 looks like a fairly good year.

According to preliminary figures of Department of Fisheries, total shrimp catches--weights are as landed, including heads-on, heads-off, etc.--for the second quarter were:

Month	1966	1965
	... (Metric Tons) ...	
April . . . . .	2,545.3	1,962.5
May . . . . .	2,447.3	2,491.8
June . . . . .	2,285.6	2,340.9
Total . . . .	7,278.2	6,795.2

During first-half 1966, Mexico shipped 11 percent more shrimp to the United States than during first-half 1965. Shipments during January-June 1966 were slightly over 28 million pounds, compared to 25.2 million pounds in 1965 (mostly heads-off weight).

The industry at Mazatlan was looking forward to a somewhat better year when the trawling season opened on September 15. Although production last season was below peak years, "nearly everyone made a little money," one operator said. The reason was high prices. These averaged 25 percent higher than before.

The entire West Coast fleet was ready when the season opened. As the fishermen say, "The first week tells the story. If it is good, the whole season will be good."

The fishery in the lagoons opened somewhat inauspiciously on September 1. Although conditions are excellent in most lagoons, with plenty of water from heavy and timely rains, the shrimp taken during the first week were unexpectedly small. They ran 70 to 80 to the pound, with some as small as 90, instead of the usual 40 to 60. However, preseason sampling indicated that

many larger shrimp left the lagoons for the ocean early, where they should be available to the fleet.

Last year's contract between boat owners and crews who are members of cooperatives continues in effect, so fishing will not be delayed by negotiations that kept the industry in turmoil last year. Most individual owners who believed the terms unfavorable sold their boats to the cooperatives; the co-ops now own about 90 percent of the Mazatlan fleet. The former boat owners still own the processing plants, which they operate only as a service for packaging and freezing the cooperatives' shrimp.

Throughout the shrimp industry, the real profit opportunities lie in vessel ownership. Last year, with very high prices and fair catches (average 55,000 pounds a boat), the cooperative owners showed a profit. A drop in either catches or prices would be a severe test of the cooperative system's ability to survive. On the other hand, an excellent season would test the willingness of the co-ops to reinvest earnings in new vessels and better equipment to better meet hard times, if and when they come.

Unofficial reports say new contract will run for 3 years and give fishermen moderate benefits to meet increased living costs. (Fisheries Attaché, Mexico D. F., September 15, 1966.)

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#### CURRENT EXPORT POTENTIAL OF MEXICAN FISHERY PRODUCTS

Extensive exports of canned sardines to the United States are not likely for 3 reasons: the only species eligible for sale as sardine in the United States under Food and Drug Administration regulations has become very scarce; by far the greatest part of production is ineligible species; the increased domestic demand for "sardines" absorbs the entire production of existing canneries.

Exports of frozen tuna have decreased in recent years largely because the growing domestic demand for canned tuna has resulted in packing almost everything the Mexican fleet catches. Only an unlikely large increase



## Mexico (Contd.):

in the fleet and catch will produce any appreciable tuna surplus for export. Two products capable of larger export--and whose production the Mexican industry is trying to increase--are spiny lobsters and frozen fish filets. (Fisheries Attaché, U. S. Embassy, Mexico, D. F., August 20, 1966.)

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ENSENADA'S FISHERMEN ARE  
HAVING GOOD YEAR

Ensenada, center of Baja California's fishing industry, is having a successful year. Baja California is Mexico's third largest fish-producing state by value and first by volume. The poor first quarter of 1966 for Ensenada's fishermen was followed by an excellent second quarter that insures a successful 1966.

Ensenada has the largest fish cannery in Mexico. During first-half 1966, it increased its production capability by 25 percent; it planned further increases during the second half as domestic and foreign demand continued to exceed production.

The spiny lobster catch for the season that ended in March was excellent. Prospects for next season appear to be even better due to the continuing introduction of more efficient production methods and closer surveillance to prohibit illegal catches during the off-season. Several United States companies have already begun bidding for the 1966/67 catch at prices averaging US\$.09 a pound higher than last year.

An Ensenada group has been considering entering the high-seas fishing business. The possibility of Yugoslavia providing 5 vessels was discussed with a Yugoslav trade mission. The Mexican Federal Government is reportedly ready to allocate 75,000,000 pesos (US\$6,000,000) to buy fishing vessels. (United States Consulate, Tijuana.)

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## MAZATLAN HAS SHIPBOARD FISH PLANT

A Mazatlan boat owner is highly pleased with his trial installation of a miniature fish meal plant aboard a former shrimp trawler. The plant, of Mexican design, is both simple and lightweight. It weighs about 1½ tons and

is mounted on deck. It consists essentially of a grinder and hot-air dryer with an auxiliary diesel engine. The fish are tossed into a hopper leading into the grinder. Within a few seconds, the ground fish is passed in front of a hot-air blast and carried by a blower to sacks. The regular fishing crew can operate the plant.

On a 24-hour basis, with a continual flow of raw fish, the plant can handle 20 metric tons. Under present working conditions, the plant processes up to 15 tons of raw fish in a 20-hour day. One ton of meal is recovered per 5 tons of raw fish and usual production is 3 tons per day.

In September 1966, the shipboard plant was handling sea catfish (bagre) almost entirely. Although this fish is rather dry, the plant was able to recover about 5 percent oil. The meal was 61 percent protein--comparing rather favorably with the 65 to 70 percent of the top-grade Peruvian anchovy meal with which it will have to compete. Because Mazatlan's climate is humid, the meal must be run through the dryer twice to reduce it to moisture content of 7 or 8 percent. The second drying was being done aboardship, but the owner planned to install an auxiliary dryer in his shrimp-freezing plant to eliminate the extra shipboard work.

As the fish go directly from trawl nets to hopper, they are extremely fresh; in fact some of the sea catfish are still alive. So there is no toxicity problem. Ten-day trips are usual because the vessel has a carrying capacity of 30 tons of meal.

The operator has so far produced about 100 metric tons of fish meal and has not tried to sell any. The crew will share in the sales proceeds, whatever the price will be; meanwhile, it is being paid on the basis of estimated price. Whether this operation becomes a financial success remains uncertain.

Another shipboard installation was reported ready to operate at Mazatlan. That vessel will not fish, but it will circulate among the shrimp fleet to pick up scrap fish caught incidentally with the shrimp. The plant itself is said to be larger and it is aboard a larger vessel. (U. S. Embassy, Mexico, September 10, 1966.)



## Chile

### FISH MEAL AND OIL PRODUCTION SOAR

From January through July 1966, total production of fish meal was 151,356 tons--double the total annual production of 1965 (70,580 tons) and nearly equal to the annual production of 1964 (156,638 tons).

The anchovy catch in northern Chile during July 1966 reached 91,781 metric tons--compared to 12,100 tons in 1965 and 36,800 tons in 1964. The port of Arica handled 75 percent; Iquique 25 percent. The catch from January to July 1966 was 834,700 tons of anchovy, compared to 281,259 tons in 1965.

Arica continues as the most active area. The fishing zones are located between 2 and 30 miles in Corazones (facing the port) and Chacalluta. Part of the Iquique fleet also operated there. In Iquique, the fishing sites most used were: Punta Quera, Chipana, Caleta Buena, San Marcos, and Punta Pichalo. During July, the 7 Arica plants operated for average of 17 working days; Iquique's 18 plants operated for average of 9 days. Two plants in Pisagua, 3 in Iquique, and 1 in Tocopilla did not operate.

Production of fish meal from anchovy during July 1966 was 17,600 metric tons, compared with 2,190 tons in 1965 and 6,980 tons in 1964. The average yield during July was 1 ton of meal to 5.2 tons of anchovy.

Prices paid for anchovy in July fluctuated between E<sup>o</sup> 52 (US\$12.50) and E<sup>o</sup> 56 (US\$13.50) a metric ton.

Fish meal production in July from species other than anchovy--hake, sardine, and jack mackerel--was 2,000 metric tons. It brought 1966 production of this type of fish meal to 17,700 tons for the first 7 months, compared to 14,600 tons in 1965 during same period.

Oil produced during July was 1,670 tons, compared with 42 tons in 1965 and 900 tons in July 1964. The average yield of oil was 1.8 percent. Production of fish oil during the first 7 months of 1966 was 16,164 tons, compared to 5,838 tons during same 1965 period. (U. S. Embassy, Santiago, September 7, 1966.)

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### HER RICHES ARE JUST OFF COASTS-- BUT FAR FROM MARKETS

Chile covers the southwest coast of South America, reaching all the way into the Antarctic waters of the Magellan straits. It is 2,600 miles long and averages 150 miles wide. The southernmost thousand miles are a maze of channels and islands similar to the fjords of Norway. These extend for more than 700 miles and end in windswept Chilean Patagonia.

The land's configuration is vitally important to Latin America's future. The very fragmentation of the coast in the south provides one of the greatest, relatively undeveloped fishing grounds on earth. And in the very near future it will have to be exploited. Dr. Hernán Santa Cruz, Assistant Director-General for Latin American Affairs, United Nations Food and Agriculture Organization (FAO) has said: "In the next 20 years this region's population will increase from 200 to 360 million. . . the total demand for agricultural products will have doubled by 1980." However, there is an alternative to this immense and very nearly impossible growth in agriculture--fish. That is why officials of the Freedom from Hunger Campaign (FFHC) have begun to look to Southern Chile.

But Latin America's "fisheries alternative" poses a problem. Although the region's fisheries production rose nearly 10 times between 1952 and 1962--compared with 68 percent in the rest of the world--most of the fish were not caught for human consumption. Almost all protein wrested from the sea was used in fish meal for animal feed and was exported to North American and European countries to earn considerable foreign exchange. According to one scientist's estimate, George Borstrom's, four-fifths of the protein produced by fisheries along the North and South American coasts is being used for animal feeding in North America and Western Europe, which consume 2 to 3 times as much protein as Chile and Peru.

### The Anchovy Dominates Production

The explanation is that anchovy accounts for most of the fish produced in western Latin America. The anchovy is almost never used for anything but poultry and stock food in the form of fish meal. The producing countries

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## Chile (Contd.):

could not possibly use it all, even if they wanted to. However, the coasts of Latin America--especially western Latin America--are extremely rich in edible seafood. To eliminate the present protein consumption deficit by 1980 in all of Latin America, it would be necessary to increase fish production by 2,000,000 metric tons edible weight, or about 4,000,000 tons of fish, round weight.

These figures caused the California Freedom from Hunger Committee to consider means of assisting the small fishermen of Puerto Montt, Chile, and neighboring Chiloe and Tenglo islands at the beginning of the vast southern archipelago.

FFHC observers quickly noticed that troubles in the fishing centers just outside Puerto Montt did not come from any lack of fish. There is great variety there and many shellfish, including oysters, scallops, sea urchins, hard clams, soft shell clams, razor clams, king crabs, lobsters, giant mussels, and Picos, or giant acornshell. But with poor equipment it was sometimes difficult to catch them and, above all, to preserve and ship them. No one yet has been able to estimate the hundreds of thousands of tons of fish that could be taken from these incredibly rich southern waters without impoverishing them. But today there are no facilities for preserving or shipping them properly to distant markets. One FAO report estimates that in some seasons probably half the catch becomes spoiled and is thrown back into the sea. Realizing this, the California Committee of the Freedom from Hunger Campaign decided to establish a Fisheries Rehabilitation Project after the disastrous 1960 earthquake in Southern Chile.

## Rehabilitation Project Started

The Committee has donated diving suits for the oyster fishermen and has studied the possibility of erecting salting and drying sheds and an ice plant. The difficulties in carrying out any ambitious crash programs are in some ways peculiar to the region itself; the region owes its rich sea life to its remoteness and the corresponding near-impossibility of getting fish to any sizable market. Drying sheds, or tunnels, for instance, are not needed primarily to reduce the fish's weight for shipping--not to conserve fish, which can be done almost as effectively with salt.



Fig. 1 - Diver collecting oysters in waters off Southern Chile. They are so plentiful that diver can fill a basket in a few minutes. (Photo by S. Larrain)



Fig. 2 - Shellfish are held in the recurring tides to keep them alive before they are marketed by a fishermen's cooperative in Southern Chile. (Photo by S. Larrain)

FFHC officials envisage the final stage of the project as the building of the first ice plant. All these projects would use local labor and thus would assist the economy.

While the project is still modest, some idea of its possible future importance can be seen in the fact that even now on the west

## Chile (Contd.):



Fig. 3 - Fisherman of Southern Chile selling his catch directly from his boat at low tide. (Photo by S. Larrain)

coast of Latin America--in Chile, Peru, and Ecuador--one-fifth of the people's total animal protein consumption comes from fish. In Ecuador, 40 percent more than the present meat production would be necessary to replace fish consumption--and this is considered far too little. Preserving and shipping fish for human food from the one region in western Latin America with a great supply can have important long-range effects.

#### Long Haul May Bring Disaster

Apart from shellfish, the sea in the immediate vicinity of Puerto Montt is especially rich in hake. This species may weigh as much as 10 or 15 pounds each, and may sell for as little as 5 cents per fish. Yet when the fish has changed hands once or twice, and is no longer fresh, it may cost as much as 50 cents. If it ever gets to a market as far away as Santiago, its price is "sky-high." Two

years ago, during Holy Week, the cooperative sent railway cars loaded with fish 600 miles up to Santiago, but lost the whole shipment when the cars were shunted to a siding and arrived 3 weeks late. Generally, the cooperative manages to get 150 to 180 boxes of fish into Santiago 3 times a week in trucks.

Much the same situation prevails with the shellfish, which are plentiful in the Puerto Montt region. Shellfish may live out of water for some time, preferably on beaches washed regularly by tides. But they die in fresh water. They must be kept cool, and so salt-water ice should be used when packing to minimize losses. Without the necessary plant, this is impossible--because the shellfish have to be packed tightly in boxes and rushed to markets hundreds of miles away in the hope that they will survive. So, in Santiago, a dozen shellfish on a plate cost as much as an entire box weighing 10 or 15 pounds in Puerto Montt. The causes of the bottleneck are always the same: lack of facilities for drying and icing, or lack of transportation, and often both.

#### Puerto Montt's Cooperative

The cooperative in Puerto Montt is fairly well equipped with boats. It has 70 small ones, mostly rowboats, and 11 larger craft with 8.5 horsepower engines. It also rents a 30-gross-ton privately-owned boat, and 5 more of 15 to 18 gross tons. It is already doing quite well, though it could do much better. The Government finances a quarter of the housing, and in a few years the cooperative expects to erect a large new school. Although no school exists as yet, only 8 percent of the families are illiterate.

The cooperatives receive other material advantages from the Government. They pay only half of the regular export tax, and they are allowed to import foreign equipment, especially machinery, free of duty. Loans may also be obtained from the Corporacion de Fomento de la Produccion, but these are generally used to buy foreign equipment and have to be repaid in dollars. Average earnings per member within the cooperative come to about \$30 a month. It is a relatively small wage, but with cheap housing and plenty to eat--including all the fish they can use--the families live fairly well. United Nations officials have learned that a good way to contact the fishermen is through their cooperative.



## Chile (Contd.):

Even projects of modest dimensions can have important effects. One day, the great archipelago of Southern Chile will become a reservoir of protein for itself and its neighbors. Then Latin Americans will eat fish on other days than Friday. (FAO, June 3, 1966.)

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## A REVIEW OF THE FISHING FLEET

At the end of 1965, the fishing fleet included 7,130 units of which 430 units belonged to the industrial fishery and were larger than 10 gross registered tons (GRT); 6,330 units were small open boats of less than 10 GRT used in traditional fishing. The total value of the fleet was estimated at US\$47.8; of this, about 86 percent, or US\$41.0 million, belonged to the primary industrial fleet.

Most of the fleet is represented by vessels whose length ranges between 12.5 and 27.5 meters (41-92 feet). The most frequent length is 20 to 22.5 meters (65.6-73.8 feet) and includes 170 units (or about 40 percent) of the total. The industrial fleet consists of vessels of 10 to 550 GRT, with the majority between 60 and 120 GRT.

Of the industrial fleet, about 300 vessels use purse-seine gear, the most common fishing gear along the Chilean coast. Seventy-three percent of these vessels fished anchovy, 24 percent sardines, and only about 3 percent tuna and bonito. The second major fishing method is trawling, used by 70 units. The third is the harpoon used for whale hunting.

The fleet is concentrated in 4 ports: Arica, Iquique, Valparaiso, and Talcahuano. Based on tonnage and number of vessels, Iquique is the principal fishing port, Valparaiso is second.

Over 300 units of the existing fleet were constructed in national shipyards; the remaining 125 units abroad. About 69 percent of the total fleet is made of steel and 31 percent of wood. The construction of the new steel fleet of 180 vessels began in 1962 at 5 national shipyards in Iquique, Antofagasta, San Antonio, and Valdivia.

Sixty-eight percent of the fleet is 5 or less years old: less than 2 years--27 per-

cent; 2 to 5 years--41 percent; 6 to 10 years--14 percent; over 10 years--18 percent.

Based on tonnage, the annual increase rate of the fleet during the past 5 years was: 1961--8 percent; 1962--16 percent; 1963--34 percent; 1964--78 percent; 1965--15 percent. From 1961-1965, the anchovy fleet increased 5.9 times; the sardine fleet 1.8 times; the fleet trawling for shrimp and spiny lobster 2 times. The number of trawlers for hake fishing and vessels used for whale-hunting remained the same. (U. S. Embassy, Santiago.)



## Ecuador

## FISHERY INDUSTRY GREW IN APRIL-JUNE 1966

The fishing and fish packing industries were among segments of the economy reporting significant developments during the second quarter of 1966.

A new subsidiary of a U. S. firm began exporting frozen tuna from Manta. While it builds its freezing plant, the subsidiary will freeze the tuna on board a vessel it will acquire. Another firm in Manta applied for classification under the Industrial Development Law to build a plant for packaging fish fillets, smoked fish, anchovies, and other products.

A small freezing plant of the fishermen's cooperative opened in Esmeraldas. Another firm, with American investment capital, was planning to operate in the same town. In Guayaquil, a firm with American capital planned to install a tuna cannery.

The Director of the Institute of Fisheries recently predicted that the industry would one day surpass the banana industry as the leading export earner. To hasten that day, the government in July 1966 granted duty-free entry of fishing supplies and equipment. (U. S. Embassy, Quito, July 29, 1966.)

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## FISHING INDUSTRY FREED FROM SOME IMPORT DUTIES

A government decree frees local fishing companies from all import duties and munic-



## Ecuador (Contd.):

ipal taxes for the importation of fishing equipment on List I (essential imports). The decree also reduces income taxes on all earnings used to buy new, or improve existing, equipment. The new legislation affects only the "extractive" phase of the industry and grants no special privileges to processing or marketing operations. Equipment acquired under the new law may not be sold or rented without authorization of the Ministry of Industries and Commerce. (U. S. Embassy, Quito, July 26, 1966.)



## Brazil

DRAFTS REVISION OF  
BASIC FISHERIES LAW

President Castello Branco in late August 1966 forwarded to the Brazilian Congress the draft of a basic fisheries law for action within 60 days. Modifications must be approved by both the Chamber of Deputies and the Senate within that period or it automatically becomes law. It was drawn up by the Superintendency for Development of Fisheries (SUDEPE) in consultation with representatives of interested Government Ministries (Agriculture, Navy, Industry and Commerce, Planning and Finance) and technicians of the Superintendency for Development of the Northeast (SUDENE), and the Food and Agriculture Organization of the United Nations. Because of this sponsorship, the bill is expected to prove less controversial than other draft bills prepared by SUDEPE in recent years. None of these reached the Congress.

The proposed legislation revokes the obsolete 1938 Fishing Code and incorporates many provisions of Decree No. 58696, June 22, 1966. The decree classified fishing and fish processing as a basic industry and provided incentives for developing commercial fisheries operations. It is expected to remain in effect to complement the new law.

There are provisions in the draft bill that hold major interest to United States and other foreign investors. Some provisions stipulate that foreign vessels may undertake commercial fishing activities in Brazilian waters when registered and authorized by

SUDEPE and also specifically authorized by executive decree. The bill establishes Brazilian fisheries jurisdiction over inland and territorial waters and the high seas and Continental Shelf in accordance with international treaties and conventions ratified by Brazil. It is expected that the Brazilian Government will shortly ratify four Geneva Conventions: on Fishing and Conservation, High Seas, Continental Shelf, and on Territorial Seas.

Among other important modifications of existing legislation: (a) duly authorized foreigners may engage in professional fishing, but Brazilian nationals shall continue to predominate in crew composition; (b) the operation of fishing vessels and processing industries will be controlled to accelerate development; (c) sets up a practicable system to protect fisheries resources; (d) establishes incentives for developing fisheries industry: exemption for 5 years from publication date of law from import, consumption, and other federal taxes on fishing boats, equipment, and spare parts when imported by firms with development projects approved by SUDEPE. The same benefits cover imports of machinery and equipment to manufacture fishing nets and similar products. Brazilian fishing firms would be exempted from income tax for five consecutive years on income reinvested in development projects. Finally, investments in the form of subscription to the capital of fishing companies with approved projects would also be exempt from income tax through 1971. (U. S. Embassy, Rio de Janeiro, September 6, 1966.)

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## CATFISH FOR SALE

According to a reliable source, the Regional Delegation of Superintendency for Development of Fisheries (SUDEPE) in Belem reports large supplies of catfish available for export from that area. The Regional Delegation understands that a number of United States firms are interested in importing catfish and will be glad to put inquirers in touch with Belem exporters. The species available are "Piramutaba" and "Mapara."

Inquiries to: Delegacia da Sudepe, Rua Dr. Assis, 62, Belem, Para, Brazil. (U. S. Embassy, Rio de Janeiro, September 8, 1966.)

## Panama

### NEW DECREE REGULATES FISH MEAL INDUSTRY

On July 20, 1966, President Marco A. Robles signed Decree Law No. 168 designed to insure orderly development of fish meal industry. The decree establishes 5 fishing zones off Pacific Coast and stipulates that vessels of not more than 2 fish meal plants, including existing plants, may fish in any one zone. The decree limits the number of fishing vessels that can be used by Panama's 2 existing plants. It also specifies that the size of future plants and fleets must be approved by the Ministry of Agriculture, Commerce and Industries. Final approval for plants will be contingent on conduct of exploratory purse-seine operations to determine maximum extent of fisheries--and to prove that anchovy and thread herring stocks will not be overfished as a result of proposed fishing operations. Exploratory fishing must be conducted at expense of applicants for licenses. Licensing fees, fines, and other aspects of fisheries regulations are described.

Apparently, the decree was prepared at request of Panama's Director of Fisheries. It is based on recommendations of members of the Inter-American Tropical Tuna Commission (IATTC) and the United Nations Food and Agricultural Organization (FAO). (U. S. Embassy, Panama, August 11, 1966.)



## Peru

### FISH MEAL PRODUCTION RESUMES--PROSPECTS GOOD

On September 1, 1966, anchovy fishing started up again after a three-month closed season to conserve the resource. Many of the country's 140 plants and estimated 1,800 fishing vessels were not quite ready. To make matters worse, rough seas kept the fleets in harbor on the northern and central coasts. In the south, fishing was reported excellent from the standpoint of catches and size of fish. The forecast is for excellent fishing at least through December 1966, though producers still complain about the pinch of increased costs. (U. S. Embassy, Lima, September 11, 1966.)



## Foreign Fishing Off U. S. Coasts, September 1966

### IN NORTHWEST ATLANTIC

For the third consecutive month, poor weather conditions on Georges Bank and vicinity limited aerial observations of foreign fishing.

**Soviet:** In September, there was no significant change in the estimated 65 to 70 Soviet fishing and support vessels on Georges Bank. Slightly over 100 Soviet vessels were reported a year ago, but they included many more smaller vessels than were present this year.

Sixty-six individual vessels sighted in September were identified as 31 factory stern trawlers, 18 large refrigerated side trawlers, 8 medium side trawlers, 5 refrigerated fish transports, one factory base ship, one fuel and water carrier, and one tug.

The fleet, while scattered, was generally divided into two groups: 30 or more vessels (mostly large side trawlers and processing ships) were fishing in a 15- to 20-mile area about 40 miles south of Nantucket Island (south of Cape Cod, Massachusetts). Heavy to moderate catches of fish appeared to be primarily whiting and incidental quantities of red hake. An equal number of vessels was widely dispersed over a 60-mile area along the northern slopes and shoals of Georges Bank (90 to 120 miles east of Cape Cod). Moderate catches visible on deck were primarily herring. The Soviet Union seems to be using more vessels in the herring fishery this year. In 1965, its herring catch on Georges Bank was limited to 36,000 metric tons.

**Romanian:** One factory stern trawler was sighted among the Soviet vessels on Georges Bank. Two such vessels were observed in 1965.

**Polish:** One stern trawler was sighted on Georges Bank. Two additional stern trawlers were fishing between Georges Bank and eastern Nova Scotia areas.

Early in October, the Polish stern trawler Pegaz entered Boston harbor to obtain emergency medical aid for a crewman.

**East German:** Early in September, a large freezer stern trawler began to fish on Georges Bank and was joined in mid-month by another sistership. Both vessels belong to the Bertold Brecht class of stern trawlers (3,000 gross tons) and were built in 1965 in East German shipyards. This is the first time since 1962 that the East Germans have fished on Georges Bank. Like the Soviet Union in the early 1960s, East Germany has begun to expand its fisheries into the southern ICNAF area, and even in the southern Atlantic.

**Cuban:** One fishing vessel came to Georges Bank late in September. Purchased in Spain for the expanding cod fisheries, the 1,100-gross-ton vessel is based in Havana.

**Japanese:** The Japanese Overseas Trawlers Association announced in mid-September that its members would jointly send a 1,000-ton trawler to explore for new fishing grounds in the Atlantic Ocean off the east coasts of North and South America. It did not say when the vessel would begin operations.

#### OFF MID-ATLANTIC

**Soviet:** No fishing vessels sighted off the U.S. mid-Atlantic coast during September except a few in transit headed north or south.

#### IN GULF OF MEXICO

**Soviet:** No fishing vessels were sighted near U.S. coasts in September. Two medium freezer trawlers (600 gross tons, class Maiak) were sighted by the U.S. Coast Guard: one on September 12 in the Old Bahama Channel (north of Central Cuba); the other on September 14 near Anguilla Cays in the Santaren Channel (160 miles south of Miami). No information is available on whether they fished or were simply in transit.

A sizable fleet (about 15 vessels) continued fishing for herring-like fish on the Campeche Banks off Yucatan. No details are available.

**Cuban:** In September, no fishing vessels were sighted near U.S. coasts; 17 of them (probably including duplications) were sighted hand-lining and trapping in the Santaren Channel, the Old Bahama Channel, and off Camaguey Archipelago. Species taken were not identified.

**Mexican:** The September 17, 1966, issue of Mexico City News reported that "at least

28 Mexican shrimpers are already operating in international waters off the Texas coast, according to the Governor of Campeche State. Although in early August shrimp trawlers were sighted fishing off Texas, none was sighted in September.

#### OFF ALASKA

**Japanese:** The usual departure of many fleets during the fall of each year reduced the number vessels engaged in the fisheries off Alaska to about 25 by the end of September.

In early September, another small trawler joined the Gulf of Alaska ocean perch fishing fleet. By month's end, however, at least 3 factory trawlers had departed for Japan; this reduced the Gulf fleet to no more than 10 trawlers. Operations of the trawlers and a few supporting reefers were concentrated on Albatross Bank southwest of Kodiak Island.

The perch fishing fleet of one factoryship and 10 trawlers had been operating in the western Aleutians, but it moved to the area west of the Pribilof Islands in early September. That fleet was scheduled to depart for Japan by mid-September.

One king crab factoryship achieved her catch quota of 90,533 cases of king crab and sailed for Japan on September 10. The second king crab fleet of 1 factoryship and 5 trawlers continued fishing north of Unimak Island. That fleet, delayed about a month in getting to the grounds, was expected to continue operations into October to reach the assigned quota of 94,467 cases.

The 4 fish-meal factoryships and their 100 trawlers left for Japan during September.

The shrimp fishing fleet, which consistently operated north of the Pribilof Islands, ceased operations and departed in early September.

The two remaining Japanese whaling fleets left the Alaskan area by mid-September for Japan.

**Korean:** The fisheries training ship Baek Kyung Ho called at Kodiak for reprovisioning in early September. Personnel said they were returning to Pusan after leaving Kodiak. The vessel stopped in Tokyo on September 25.

**Soviet:** A gradual decline (first reported in July 1966) in the number of Soviet fishing vessels sighted off Alaska continued during September. Only 30 to 35 vessels were sighted by the end of the month. By mid-month, the Gulf of Alaska ocean perch effort was reduced to a few factory stern trawlers fishing southwest of Chirikof Island.

Perch fishing along the Aleutian Islands continued throughout September. About 15 large factory stern trawlers (serviced by a few refrigerated fish transports and other support ships) were scattered from the Fox Islands to the western Aleutians, but fished mostly south of Umnak Pass (in the Segum Pass region) and in the shoal areas west of Kiska Island. One haul of 4,000-5,000 pounds of Pacific ocean perch was observed aboard a Soviet vessel in late September near Umnak Pass.

The shrimp fishery near the Shumagin Islands was expanded during September. Resumed in August, that fishery attracted about 10 medium freezer trawlers and 2 refrigerator vessels. Observers noted one haul aboard a vessel of about 400-500 pounds of shrimp (presumably mostly pink shrimp).

Whaling fleets discontinued their operations off U. S. coasts during the month.

#### OFF PACIFIC NORTHWEST (Washington and Oregon)

**Soviet:** The number of fishing and support vessels (about 80) off the Pacific Northwest did not change from August to September. Two-thirds were medium side trawlers and the rest stern trawlers and support vessels. The number of large stern factory trawlers, reduced in August and early September to no more than 6, increased during the latter part of September. By the month's end, about 12 stern trawlers operated in scattered formations from Cape Flattery (Wash.) to Heceta Head (Oreg.). This was a considerable increase in total fishing effort because a stern factory trawler fishes an average 6-7 times more than a medium side trawler during the same period.

In the first week of September, most vessels moved from the Oregon coast north to the waters off southern Washington, where they concentrated near the Columbia River (18 vessels) and off Grays Harbor (60 vessels). They apparently moved to where fish

were concentrating and worked until the schools were fished out or scattered. Then the fleet moved to new locations. By mid-month, almost half the fleet returned to Oregon grounds.

By September 20, 1966, the fleet was divided into two major groups: 34 vessels (including 6 stern trawlers) were fishing for hake off Oregon's coast between Heceta Head and Yaquina Head, or about 12 to 40 miles west of Newport; another 48 vessels, also taking primarily hake, were fishing off Washington's coast between Grays Harbor and Destruction Island. One pair of mid-water trawls and 2 factory stern trawlers were observed in the second group. This was the fleet deployment also at the end of the month--except that on September 30, the fleet off Oregon consisted of 40 vessels, most of which came south from the fishing grounds off Washington.

The species landed during September were primarily Pacific hake. However, BCF agents saw on occasion ocean perch and various rockfish (orange, green, and others) mixed with hake catches--but they comprised only a small part of the total catch.

Early in September, the personnel carrier Smolnii was sighted off the Pacific Northwest. She brought replacement crews from the Soviet Union. The Soviets use personnel carriers to transport replacement crews because they believe this method is cheaper than having a fishing vessel return to port to rotate crews.

The fishery research vessel Ogon conducted studies, mostly off Washington, throughout the month.

On September 25, 1966, a gear conflict occurred near Destruction Island between the U. S. troller Mermaid and a Soviet trawler. In darkness, the Soviet trawler crossed Mermaid's bow and picked up her anchor line with its trawl. Towing the much smaller Mermaid for half an hour, the Soviet captain did not see the Mermaid's signals to stop. The latter finally worked herself free but lost her anchor. The case was reported to U. S. Coast Guard authorities in Seattle.





# PUBLICATIONS

## FISH AND WILDLIFE SERVICE

These publications are available free from the Office of Information, U. S. Fish and Wildlife Service, Washington, D. C. 20402. Publications are designated:

CFS --Current fishery statistics of the United States.

FFL --Reprints of reports on foreign fisheries.

FL --Fishery leaflets.

Sep. --Separates (reprints) from Commercial Fisheries Review.

SL --Statistical lists of dealers in and producers of fishery products and byproducts.

Number	Title
CFS-4166--	Frozen Fishery Products, June 1966, 8 pp.
CFS-4189--	New York Landings, May 1966, 4 pp.
CFS-4191--	Fish Meal and Oil, June 1966, 2 pp.
CFS-4192--	Rhode Island Landings, March 1966, 3 pp.
CFS-4194--	Massachusetts Landings, February 1966, 6 pp.
CFS-4197--	Maine Landings, May 1966, 4 pp.
CFS-4198--	Shrimp Landings, February 1966, 5 pp.
CFS-4201--	New Jersey Landings, June 1966, 3 pp.
CFS-4202--	California Landings, May 1966, 4 pp.
CFS-4204--	Virginia Landings, June 1966, 4 pp.
CFS-4209--	New York Landings, June 1966, 4 pp.
CFS-4210--	Alabama Landings, May 1966, 3 pp.
CFS-4215--	Florida Landings, July 1966, 8 pp.

### Wholesale Dealers in Fishery Products (Revised):

SL-11--	Washington, D. C., 1966, 1 p.
SL-32--	Minnesota, 1966, 1 p.
SL-33--	North Dakota (Mississippi River and Tributaries), 1966, 1 p.
SL-34--	Wisconsin (Mississippi River and Tributaries), 1966, 2 pp.
SL-36--	Iowa (Mississippi River and Tributaries), 1966, 2 pp.
SL-39--	Tennessee (Mississippi River and Tributaries), 1966, 2 pp.

SL-43--Alabama (Mississippi River and Tributaries), 1966, 1 p.

SL-44--Nebraska (Mississippi River and Tributaries), 1966, 1 p.

SL-49--South Dakota (Mississippi River and Tributaries), 1966, 1 p.

Sep. No. 772--Willapa Oyster Studies--Use of the Pasture Harrow for the Cultivation of Oysters.

FL-591--Fishery Motion Pictures, 24 pp., 1966. Lists commercial fishery motion pictures produced and distributed by BCF, gives instructions on how to borrow films, and lists tentative titles of future films.

Annual Report of the Bureau of Commercial Fisheries Radiobiological Laboratory Beaufort, N. C. for the Fiscal Year Ending June 30, 1965, by T. R. Rice, Circular 244, 53 pp., illus., July 1966. Presents information on research carried on as part of a cooperative project by BCF and U. S. Atomic Energy Commission. Discusses estuarine ecology, biogeochemistry, pollution studies, and radiation effects programs.

Available from BCF, Branch of Current Economic Analysis, 1815 N. Ft. Myer Drive, Arlington, Va. 22209:

Shellfish Situation and Outlook, CEA-S2, 55 pp., September 1966. The second in series of quarterly publications designed mainly to assist fishery management in making decisions on short-run and intermediate production, distribution, and pricing. Available pertinent shellfish facts are assembled and analyzed to give picture of probable market conditions and price movements in the future.

The following Foreign Fishery Leaflets (formerly Market News Leaflets) are available from the Branch of Foreign Fisheries, Bureau of Commercial Fisheries, Room 8015, U. S. Department of the Interior, Washington, D. C. 20240:

FFL-8--"Portugal's Fishing Industry," 28 pp., Aug. 1966. Contains information on commercial catch by principal species; cannery production; consumption; fish meal, oils, and waste; and foreign trade.

FFL-13--"India's Fishing Industry, 1964," 8 pp., Nov. 1965. This pamphlet discusses

a United States firm and Indian Government collaboration; Indo-Icelandic collaboration in Tuticorin and fishery production and developments in 1964.

FFL-18--"Panama's Fisheries, 1965," 10 pp., Mar. 1966. The leaflet discusses shrimp production, trends, and exports; fish reduction industry and fish meal and oil exports; other fisheries; and fisheries legislation.

FFL-57--"Fisheries in the Federal Republic of Germany Annual Survey 1965," 8 pp., May 1966. Gives information on total catch landed in German ports and abroad in 1965; financial returns; imports of fish meal and fish oil; the fishing fleet; marketing and processing; foreign trade; EEC developments; and other interesting facts.

FFL-56--"Norwegian Fisheries, 1965," 36 pp., Aug. 1966. Discusses Norwegian cod and herring fisheries; fish species other than cod and herring; disposition of the catch; exports and imports, prices and aid to the industry; and outlook.

FFL-102--"Fisheries Development Potential of the Territory of Baja California Sur, Mexico," 11 pp., Sept. 1966. Discusses potential productive fishing areas, species, ports, and status of fishing industries of Baja California Sur.

The following English translation of a foreign language article is available from the U. S. Bureau of Commercial Fisheries, 101 Seaside Avenue, Terminal Island, California 90731:

Pacific Salmon in the Northern Waters, III. Conditions of Stocks, by Tomonari Matsushita, Translation No. 20, 45 pp., January 11, 1965. (Translated by Peter Miyake from the Japanese, Fisheries Research Series 6-3.)

The following publications are available only from the specific office mentioned:

California Fishery Market News Monthly Summary, Part I--Fishery Products Production and Market Data, August 1966, 15 pp. (Market News Service, U. S. Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif. 90731.) California cannery receipts of tuna and tunalike fish and other species used for canning; pack of canned

tuna, tunalike fish, sardines, mackerel, and anchovies; market fish receipts at San Pedro, Santa Monica, and Eureka areas; California and Arizona imports; canned fish and frozen shrimp prices; ex-vessel prices for cannery fish; prices for fish meal, oil, and solubles; for the month indicated.

California Fishery Market News Monthly Summary, Part II--Fishing Information, August 1966, 10 pp., illus. (U. S. Bureau of Commercial Fisheries, Tuna Resources Laboratory, P. O. Box 271, La Jolla, Calif. 92083.) Contains sea-surface temperatures, fishing and research information of interest to the West Coast tuna-fishing industry and marine scientists; for August.

Fish Farming--a Growing Industry, 40 pp., Aug. 1966, illus. (U. S. Department of the Interior, Bureau of Commercial Fisheries, 5 Research Drive, Ann Arbor, Mich. 48103.)

Investigations in Fish Control, illus., Jan. 1966. (Fish Control Laboratories, Bureau of Sport Fisheries and Wildlife, U. S. Department of the Interior, P. O. Box 862, La Crosse, Wis. 54602.) Contains Reports 3 through 11:

Report 3--"Minimum lethal levels of toxaphene as a piscicide in North Dakota lakes," by Dale L. Henegar, 16 pp. (Resource Publication 7.)

Report 4--"Effects of toxaphene on plankton and aquatic invertebrates in North Dakota lakes," by Robert G. Needham, 16 pp. (Resource Publication 8.)

Report 5--"Growth rates of yellow perch in two North Dakota lakes after population reduction with toxaphene," by Donald C. Warnick, 9 pp. (Resource Publication 9.)

Report 6--"Mortality of some species of fish to toxaphene at three temperatures," by Mahmoud Ahmed Mahdi, 10 pp. (Resource Publication 10.)

Report 7--"Treatment of East Bay, Alger County, Michigan, with toxaphene for control of sea lampreys," by William E. Gaylord and Bernard R. Smith, 7 pp. (Resource Publication 11.)

Report 8--"Effects of toxaphene on fishes and bottom fauna of Big Kitoi Creek, Afog-

nak Island, Alaska," by William R. Meehan and William L. Sheridan, 9 pp. (Resource Publication 12.)

Report 9--"Relation of chemical structure to fish toxicity in nitrosalicylanilides and related compounds," by Charles R. Walker, Roland J. Starkey, and Leif L. Marking, 12 pp. (Resource Publication 13.)

Report 10--"Evaluation of p, p'-DDT as a reference toxicant in bioassays," by Leif L. Marking, 10 pp. (Resource Publication 14.)

Report 11--"Evaluation of an electronic method of measuring hematocrits of fish," by Richard A. Schoettger and Arnold M. Julin, 11 pp. (Resource Publication 15.)

(Seattle) Washington and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, August 1966, 10 pp. (Market News Service, U. S. Fish and Wildlife Service, 706 New Federal Office Bldg., 909 First Ave., Seattle, Wash. 98104.) Includes landings by halibut fleet reported by Seattle Halibut Exchange; salmon landings reported by primary receivers; landings of halibut reported by International Pacific Halibut Commission; landings and otter-trawl receipts reported by Fishermen's Marketing Association of Washington; local landings by independent vessels; coastwise shipments from Alaska by scheduled and non-scheduled shipping lines and airways; imports from British Columbia via rail, motor truck, shipping lines, and ex-vessel landings; and imports from other countries through Washington customs district for August.

## MISCELLANEOUS

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them. Correspondence regarding publications that follow should be addressed to the respective organization or publisher mentioned. Data on prices, if readily available, are shown.

### ALABAMA

"Commercial Fisheries Research Act aids Seafoods Division," by Johnnie H. Crance, article, *Alabama Conservation*, vol. XXXVI, no. 4, June-July 1966, pp. 18-21, illus., printed. Alabama Department of Conservation, 64 No. Union St., Montgomery, Ala. 36104.

### AUSTRALIA:

"Victorian offshore scallop explorations," by M. J. Sanders, article, *Australian Fisheries Newsletter*, vol. 25, no. 8, August 1966, pp. 11 & 13, illus., printed. Fisheries Branch, Department of Primary Industry, Canberra, A.C.T., Australia.

### BOWFIN:

"Controversial bowfin found in many areas, but Ox-Bow Lakes are his hangout," by Pete A. Hackney, article, *Alabama Conservationist*, vol. XXXVI, no. 4, June-July 1966, pp. 22-24, illus., printed. Alabama Department of Conservation, 64 No. Union St., Montgomery, Ala. 36104.

### CALIFORNIA:

*California Fish and Wildlife Plan*, vol. 1, Summary, 110 pp., printed, January 1, 1966. State of California Resources Agency, Department of Fish and Game, 1416 Ninth St., Sacramento, Calif. 95814. The plan is major step in management of California's fish and wildlife resources. Presents situations and conditions which face fish and wildlife resources through 1980--and suggestions for actions to maintain or improve State's wildlife resources. Information on species of fish in inland waters (except salmon and steelhead), amount and kind of habitat for various fish, potential fish production, accessibility, and present use and yield. Seven categories: trout, warm-water fish, striped bass, American shad, sturgeon, Salton Sea fish, and non-game fish. Types of inland fish habitat discussed are cold-water streams and canals, lakes, and reservoirs; combination cold-water and warm-water lakes and reservoirs; tidal channels; and unproductive waters. This plan should serve as guide and basis for all activities by government, business, industry, or private individuals which affect fish and wildlife resources.

### CANADA:

*Journal of Fisheries Research Board of Canada* reprints. Fisheries Research Board of Canada, Biological Station, Nanaimo, B. C., Canada: vol. 21 (1964), no. 5: "Ocean growth and mortality of pink and chum salmon," by W. E. Ricker, pp. 905-931; "Estimation of sea mortality rates for the 1960 brood-year pink salmon of Hook Nose Creek, British Columbia," by Robert P. Parker, pp. 1019-1034; "Ocean migrations of Pacific salmon," by

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

Ferris Neave, pp. 1227-1244; "A quantitative estimate of the number of Pacific herring in a spawning population," by D. N. Outram and F. H. C. Taylor, pp. 1317-1320; "Further information on spawning stock size and resultant production for Skeena sockeye," by M. P. Shepard, F. C. Withler, J. McDonald, and K. V. Aro, pp. 1329-1331.

Vol. 22 (1965), no. 6: "Parasites as an auxiliary source of information about the biology of Pacific salmon (Genus *Oncorhynchus*)," by L. Margolis, pp. 1387-1395; "Estimation of sea mortality rates for the 1961 brood-year pink salmon of the Bella Coola Area, British Columbia," by Robert R. Parker, pp. 1523-1553.

Journal of the Fisheries Research Board of Canada, vol. 23, no. 8, August 1966, pp. 1109-1288, illus., printed, single issue Canada, U. S., and Mexico C\$1.00, all other countries C\$1.25. Fisheries Research Board of Canada, Sir Charles Tupper Building, Ottawa 8, Ontario, Canada. Includes articles on: "Depth distribution of oceanic shrimps (Decapoda; *Natantia*) off Oregon," by William G. Percy and Carl A. Forss, pp. 1135-1143; "Oxygen dissociation curves of the blood of Atlantic salmon (*Salmo salar*) acclimated to summer and winter temperatures," by Edgar C. Black, Harold H. Tucker, and Donald Kirkpatrick, pp. 1187-1195; "Food and growth of fishes. III. Relations among food, body size, and growth efficiency," by J. E. Paloheimo and L. M. Dickie, pp. 1209-1248; "Steroid transformations by corpuscles of stannius of the Atlantic cod (*Gadus morhua* L.)," by D. R. Idler and H. C. Freeman, pp. 1249-1255; "A portable aquarium for use at sea to photograph fish and aquatic life," by T. F. Pletcher, pp. 1271-1275; "Thermal resistance of bacteria isolated from a heat processed fish product," by J. W. Boyd and B. A. Southcott, pp. 1281-1283.

New Chart of Nova Scotia Southeast Coast, Chart 4012, drawn to scale of 1:300,000 (about 4 miles to the inch), replaces Chart 4350, Halifax to Cape Sable. It is second in series that will cover the Canadian Maritime coastal area. The first was Chart 4010, Bay of Fundy, published in 1965. The charts are designed for both offshore navigation and use by fishing industry. They show shape of ocean floor by closely spaced

blue contour lines. Chart 4012 is also available in two latticed versions: L(D7) 4012, which shows Decca lattice for Nova Scotia Chain 7; and 4012-L, which shows the three Loran-A rates covering area. Copies of Chart 4012 may be obtained for \$1 each, or \$2 each for latticed versions, from chart dealers or Chart Distribution Office, Canadian Hydrographic Service, 615 Booth Street, Ottawa, Canada.

#### CATFISH:

"Channel catfish show promise," by Robert M. Hatcher, article, The Tennessee Conservationist, vol. XXXII, no. 4, Apr. 1966, pp. 14-15, 38, illus., printed. Editorial Office, Suite 218, Department of Conservation, 2611 West End Ave., Nashville, Tenn. 37203.

#### CEYLON:

Bulletin of the Fisheries Research Station Ceylon, printed, single issue Rs. 5.00 (US\$0.70). The Fisheries Research Station, P. O. Box 531, Colombo, Ceylon; vol. 16, no. 1, June 1963, 93 pp., illus. Among others, contains these articles: "Bacteriology of chilled water during the preservation of fish," by N. N. de Silva and A. H. W. Mendis, pp. 1-8; "A guide to the freshwater fauna of Ceylon, Supplement I," by C. H. Fernando, pp. 29-38; "Small scale manufacture of crude agar from *Gracilaria* seaweeds," by C. Gunasekera, pp. 49-52.

Vol. 17, no. 1, June 1964, 150 pp., illus. Among others, contains these articles: "Socio-Economic Survey of Fisher Families, 1958-59," by G. N. de Silva, pp. 1-44; "Assessment and Possible Development of the Fishery Resources of Pedro Bank," by S. Sivalingam, pp. 133-150.

Vol. 18, no. 1, June 1965, 34 pp., illus. Includes articles on: "A preliminary survey of 21 Ceylon Lakes--1. Fisheries of two Lakes, Parakrama Samudra and Minneriya Wewa," by H. H. A. Indrasena, pp. 1-5; "A preliminary survey of 21 Ceylon Lakes--2. Limnology and fish production potential," by A. S. Mendis, pp. 7-16; "The ecology of *Gracilaria verrucosa* (Hudson) Papenfuss (Formerly *G. confervoides* (L.) Greville) in Koddiyar Bay, Trincomalee," by M. Durairatnam, pp. 29-34.

#### CHARTS:

The following charts are sold by Coast and Geodetic Survey sales agents, district offices, and the Washington office. New edi-



These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

tions contain information essential to safe navigation--and cancel former editions. Mariners are warned against using obsolete charts.

ALASKA--Port Malmesbury, 3rd edition of Chart No. 8299 issued Aug. 15, 1966, scale of 1:40,000. Price: 25 cents a copy.

CALIFORNIA--Santa Monica Bay, 10th edition of Chart No. 5144 issued Aug. 15, 1966; scale of 1:40,000 and 1:20,000. Price: 50 cents a copy.

#### FLORIDA

Estero Bay to Lemon Bay--Including Charlotte Harbor, 9th edition of Chart No. 1255 issued Aug. 1, 1966; scale of 1:80,000. Price: \$1.00 a copy.

Tampa Bay and St. Joseph Sound, 11th edition of Chart No. 1257; scale of 1:80,000. Price: \$1.00 a copy.

#### WASHINGTON

Puget Sound--Seattle to Bremerton, 3rd edition of Chart No. 6446 issued Aug. 8, 1966; scale of 1:25,000. Price: \$1.00 a copy.

Seattle Harbor, Elliott Bay and Duwamish Waterway; 2nd edition of Chart No. 6442 issued Aug. 8, 1966; scale of 1:10,000. Price: \$1.00 a copy.

Str. of Juan de Fuca to Str. of Georgia, 13th edition of Chart No. 6380 issued Aug. 1, 1966; scale of 1:20,000. Price: \$1.00 a copy.

WASHINGTON-OREGON--Sundale to Heppner Junction, 2nd edition of Chart No. 6160 issued Aug. 22, 1966; scale of 1:20,000. Price: 50 cents a copy.

#### CRAB(S)

"Observations on the Social Behavior of the Land Hermit Crab, *COENOBITA CLYPEATUS* (Herbst)," by Brian A. Hazlett, 2 pp., printed. (Reprinted from *Ecology*, vol. 47, no. 2, Early Spring 1966, pp. 316-317.) Ecological Society of America, Duke University Press, Box 6697, College Station, Durham, N. C.

"Osmoregulation in the Adult Blue Crab, *CALLINECTES SAPIDUS* Rathbun," Eng Chow Tan and W. A. Van Engel, 5 pp., illus., printed. (Reprinted from *Chesapeake Science*, vol. 7, no. 1, March 1966, pp. 30-35.) Natural Resources Institute, University of Maryland, Chesapeake Biological Laboratory, Solomons, Md. 20688.

"The Behavior of Some Deep-Water Hermit Crabs (Decapoda: Paguridea) from the Straits of Florida," by Brian A. Hazlett, 17 pp., illus., printed. (Reprinted from *Bulletin of Marine Science*, vol. 16, no. 1, Mar. 1966, pp. 76-92.) Institute of Marine Science, 1 Rickenbacker Causeway, Virginia Key, Miami, Fla. 33129.

#### FOOD AND AGRICULTURE ORGANIZATION:

*Catalogue of Films and Film Strips 1966*, 125 pp., illus., printed, 1966. Food and Agriculture Organization, Via delle Terme di Caracalla, Rome, Italy. Lists films and filmstrips covering various countries and subjects (including fisheries) available on loan from FAO. Films are 16 mm., mostly in color, with sound, and running time varies from 8 to 30 minutes.

Indo-Pacific Fisheries Council, Occasional Papers 66/1-66/10: contributed to the 11th Session of the Council, Kuala Lumpur, Malaysia. Oct. 16-31, 1964. Processed in English. 1966. Indo-Pacific Fisheries Council, FAO Regional Office for Asia and the Far East, Bangkok, Thailand:

66/1: Preliminary Bibliography of Fish and Fisheries Certain Parts of the Pacific, 68 pp.

66/2: Legislative and Administrative Aspects of Water Pollution Control, 14 pp.

66/3: Recent Activities in the Field of Fisheries Statistics in Japan, 7 pp.

66/4: A Brief Note on Fisheries Insurance in Japan, 9 pp.

66/5: A Note on the Technique of Spawning *Puntius javanicus* Blkr. for Fry Production, 5 pp.

66/6: Fish Population and Ecological Studies of Flood-Water Fisheries in Pra Nakorn Sri-Ayuthaya Province, 45 pp., illus.

66/7: The breeding of giant gouramy (*Osfrophonus goramy* Lacepede) in Ceylon and the Rearing of Its Fry in the Departmental Fish Hatcheries, 16 pp., illus.

66/8: Culture of Brackishwater Fishes in Impoundments, 20 pp., illus.

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

66/9: Collection and Storage of Data for Stock Assessment Studies, 38 pp., illus.

66/10: Fish Marketing Automatic Convertible Corporation, 60 pp.

"The export trade in fishery products of developing countries," by R. Hamlish, article, International Trade Forum, vol. II, no. 1, March 1966, pp. 18-23, illus., printed. GATT International Trade Centre, Villa Le Bocage, Palais des Nations, 1211 Geneva 10, Switzerland.

#### FRANCE:

"La production de la pêche au large de l'Afrique occidentale a augmenté 600% en quinze ans" (The production of fish along the west coast of Africa has increased more than 600 percent in 15 years), article, La Pêche Maritime, vol. 45, no. 1058, May 20, 1966, pp. 325-331, illus., printed in French. La Pêche Maritime, 190, Boulevard Haussmann, Paris 8<sup>e</sup>, France.

#### FRESH-WATER FISH:

"Freshwater commercial fishing," by Lloyd Posey, article, Louisiana Conservationist, vol. 18, nos. 9 & 10, Sept.-Oct. 1966, pp. 18-20, illus., printed. Louisiana Conservationist, Wildlife & Fisheries Bldg., 400 Royal St., New Orleans, La. 70130.

#### INDIA:

Indian Journal of Fisheries, vol. IX, no. 2, Section B, October 1962 (issued Nov. 1965), pp. 91-161, illus., printed, single issue 8 rupees (US\$1.05) net. Ministry of Food and Agriculture, New Delhi, India. Includes articles on: "On the effect of tickler chain on the catch of a 10 ft. beam trawl net," by S. D. Deshpande and T. M. Sivan, pp. 91-96; "Quality studies on round, headless and peeled and deveined prawns held in ice storage," by Smt. Susamma Jacob, K. Mahadeva Iyer, M. Rajendranathan Nair, and V. K. Pillai, pp. 97-107; "Studies on Indian fishmeals, Part I. Chemical composition and storage characteristics of fishmeals prepared from different types of fishes," by P. V. Kamasastri and D. Ramananda Rao, pp. 108-117; "Free amino-acids in spoiling mullet," by Gita Menon, pp. 118-125; "A preliminary study of the changes associated with lipid breakdown in oil sardine (*Sardinella longiceps*) stored at refrigerated temperatures," by M. Rajendranathan Nair, pp. 126-132; "Preliminary studies

on the characteristics of otter trawls--horizontal opening and towing resistance," by A. V. V. Satyanarayana and R. S. Nair, pp. 133-144; "'Chala Vala' encircling gill nets for sardines and mackerels of the Kerala coast with special reference to their design and construction," by A. V. V. Satyanarayana and K. A. Sadanandan, pp. 145-155; "Storage behaviour of salted and dried fish in relation to humidity conditions," by S. V. Suryanarayana Rao, A. P. Valsan, M. K. Kandoran and M. R. Nair, pp. 156-161.

#### INDUSTRIAL FISHING:

"Bathymetric difference in the frequency distribution of daily hauls by the Danish seiners belonging to a fish-meal fleet in the Bering Sea," by Shiro Minami and Hiroshi Maeda, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 31, May 1965, pp. 346-349, printed. Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku, Tokyo, Japan.

#### JAPAN:

Bulletin of the Faculty of Fisheries, Hokkaido University, vol. 16, no. 3, November 1965, pp. 137-200, illus., printed in Japanese and English. Faculty of Fisheries, Hokkaido University, Hakodate, Japan. Includes articles on: "Difference in selectivity of salmon gill net according to the materials of the net threads," by Motokazu Ueno, Seikichi Mishima and Shoichi Yamamoto, pp. 143-153; "Salmon population and hydrography on the high sea fishing grounds developed in the southwest on the Attu Islands in the North Pacific, during the early period of the fishing season," by Takeji Fujii, Kiyoshi Masuda and Tsuneo Nishiyama, pp. 154-163; "Freeze vacuum drying of marine products. V," by Kiichirō Kobayashi and Shūzō Igarashi, pp. 164-170; "Enzymatic studies on the muscle of aquatic animals. V," by Takeshi Shibata, Tadashi Kitahara and Katsuji Yoshimura, pp. 171-182.

#### LOUISIANA:

Occurrence, Abundance, and Size Distribution of Fishes and Crustaceans Collected with Otter Trawl in Vermillion Bay, Louisiana, by William Stanley Perret, 76 pp., illus., processed, June 1966. University of Southwestern Louisiana, Lafayette, Louisiana.

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

#### MARINE BIOLOGY:

"Florida biologist discovers fish grow three times as fast when fed with iron," article, National Maine Coast Fisherman, vol. 45, Feb. 1965, p. 25, printed. National Maine Coast Fisherman, 22 Main St., Camden, Maine 04843.

#### MEXICO:

"Algunas Observaciones Preliminares Relacionadas con el Estudio de los Problemas de Venta de Pescado en la Florida (Some Preliminary Observations Relating to the Problems of Selling Fish in Florida), Tra-bajos de Divulgacion, vol. X, no. 91, 12 pp., illus., processed in Spanish, Sept. 1964. Instituto Nacional de Investigaciones, Biologico-Pesqueras, Departamento de Estudios Biologicos Pesqueros, Direccion General de Pesca e Industrias Conexas, Secretaria de Industria y Comercio, Mexico D. F., Mexico.

#### MICROBIOLOGY:

"Microbiology and chemistry of fermented fish," by Prasert Saisithi and others, article, Journal of Food Science, vol. 31, Jan.-Feb. 1966, pp. 105-110, printed. The Garrard Press, 510-524 North Hickory St., Champaign, Ill. 61820.

#### NORWAY:

Fiskets Gang, vol. 52, illus., printed in Norwegian. Fiskeridirektoratet, Rådstuplass 10, Bergen, Norway, no. 16, April 21, 1966, pp. 290-309. Includes articles on: "Vintersildinnsigene 1966" (Shoreward movements of winter herring 1966), by Finn Devold, pp. 299-301; "Vandringer av merket pigghå i Nordvest-Atlanteren" (Movements of tagged dogfish in the North-west Atlantic), by Olav Aasen, p. 302; "Merkeforsøk på gullflyndre (Pleuronectes platessa) i Norske farvann" (Marking experiments on plaice in Norwegian waters), by Olav Stålesen, pp. 303-307.

No. 20, May 19, 1966, pp. 386-403. Includes articles on: "Rapport om leitetjenesten under sildeinnsiget i Vesteraleen 1966 med M/S Stalvard" (Report on searching for herring in Vesteraleen in 1966 with M/S Stalvard), by Vermund Dahl, pp. 395-396; "Rapport om M/S Stalvard's leitetjenete under vintersild-fisket utenfor Kristiansund 1966" (Report on M/S Stalvard's searching during

the winter herring fishery off Kristiansund in 1966), by Vermund Dahl, pp. 397-398; "Rapport vedrørende botnagarnsunderøkelsene under varsildfisket 1966" (Report on investigations of the bottom gill nets during the spring herring fishery in 1966), by Vermund Dahl, p. 399.

#### OCEANOGRAPHY:

"Oceanography in Britain: significant new support," article, Science, vol. 153, no. 3737, August 12, 1966, pp. 727-728, printed, single issue 35 cents. American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005.

"Oceanography of the Grand Banks Region of Newfoundland in 1965," by Ronald C. Kollmeyer, Thomas C. Wolford, and Richard M. Morse, Oceanographic Report no. 11, CG 373-11, 164 pp., illus., printed, June 1966. United States Coast Guard Oceanographic Unit, Washington, D. C. 20004.

"The role of UNESCO in international oceanography," by Mr. E. Highley, article, Information, vol. XVII, no. 3, May 1966, pp. 5-8, illus., printed. Australian National Advisory Committee for UNESCO, P. O. Box 189, North Sydney, Australia.

#### OYSTERS:

"Oyster Mortality Studies in Virginia. V. Epizootiology of MSX, a Protistan Pathogen of Oysters," by Jay D. Andrews, 13 pp., illus., printed. (Reprinted from Ecology, vol. 47, no. 1, Winter 1966, pp. 19-31.) Ecological Society of America, Duke University Press, Box 6697, College Station, Durham, N. C.

"Reproductive Cycle of American Oyster, CRASSOSTREA VIRGINICA in West Loch, Pearl Harbor, Hawaii," by Henry M. Sakuda, 3 pp., illus., printed, 1966. (Reprinted from Transactions of the American Fisheries Society, vol. 95, no. 2, Apr. 1966, pp. 216-218.) American Fisheries Society, 1404 New York Ave. NW., Washington, D. C. 20005.

#### PARASITES:

"LOXOTHYLACUS PANOPAEI (Cirripedia, Sacculinidae) an Introduced Parasite on a Xanthid Crab in Chesapeake Bay, U. S. A.,"

These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

by W. A. Van Engel, and others, Contribution No. 181, 2 pp., printed. (Reprinted from Crustaceana, vol. 10, part 1, 1966, pp. 111-112.) Virginia Institute of Marine Science, Gloucester Point, Va.

#### PERU:

"Peru's giddy anchovy hunt," by Hermann Einarsson, article, New Scientist, vol. 26, 1965, pp. 777-778, printed. Cromwell House, Fulwood Pl., High Holborn, London WC1, England.

Publications issued by Instituto del Mar del Peru, Apartado 3734, Lima, Peru, illus., processed in Spanish:

Las Poblaciones de Aves Guaneras y su Situacion Actual (Guano Bird Populations and Their Status), by Romulo Jordan and Humberto Fuentes, Informe No. 10, 31 pp., April 1966.

Informe Preliminar Del Crucero 6602 (Cabo Blanco-Arica)--(Preliminary Data on Cruise 6602), by Oscar Guillen and Francisco Vasquez, Informe No. 12, 27 pp., April 1966.

Report on the Effects of Fishing on the Peruvian Stock of Anchovy, by L. K. Boerema, G. Saetersdal, I. Tsukayama, J. E. Valdivia, and B. Alegre, FAO Fisheries Technical Paper No. 55 (Fib/T55), 47 pp., illus., processed, December 1965, distribution restricted. Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, Rome, Italy. Summarizes biological information available; analyzes length, catch, effort, and catch per unit of effort; estimates mortality; discusses conclusions; and gives recommendations.

#### PHYTOPLANKTON:

"A Phytoplankton Study of the Amazon Region," by E. J. Ferguson Wood, 22 pp., illus., printed. (Reprinted from Bulletin of Marine Science, vol. 16, no. 1, Mar. 1966, pp. 102-123.) Institute of Marine Science, 1 Rickenbacker Causeway, Virginia Key, Miami, Fla. 33129.

"Some Implications of Nutrient Enrichment on Different Temporal Stages of a Phytoplankton Community," by Robert O. Fourrier, 9 pp., illus., printed. (Reprinted from Chesapeake Science, vol. 7, no. 1,

Mar. 1966, pp. 11-19.) Natural Resources Institute, University of Maryland, Chesapeake Biological Laboratory, Solomons, Md. 20688.

#### PLANKTON:

"Marine Ostracoda from Western North Atlantic Ocean off the Virginia Coast," by Neil C. Hulings, 17 pp., illus., printed. (Reprinted from Chesapeake Science, vol. 7, no. 1, March 1966, pp. 40-56.) Natural Resources Institute, University of Maryland, Chesapeake Biological Laboratory, Solomons, Md. 20688.

#### POND FISHERIES:

Ponds for Fishing (Revised), 33 pp., illus., printed, 1966. Missouri Department of Conservation, North Ten Mile Drive, Jefferson City, Mo. 65102. Discusses selection of site and planning for pond, care of new pond and its watershed, plants for pond and wildlife protection, clearing a muddy pond, pond sealing, stocking with fish, water fertilization, aquatic plant control, and aquatic weed illustrations. The booklet lists government agencies that give without cost expert assistance in building and managing a good pond.

#### PORTUGAL:

"O ano de 1965 melhor que 1964 para pesca do atum" (Tuna fishery better in 1965 than in 1964), article, Jornal do Pescador, vol. XXVIII, no. 330, July 1966, p. 63, printed in Portuguese. Junta Central dos Cosas dos Pescadores, R. de S. Bento, 644-4.º, Esq.º, Lisbon, Portugal.

#### PUERTO RICO:

Contributions from the Institute of Marine Biology, University of Puerto Rico, vol. V, Jan.-Dec. 1964, printed. Institute of Marine Biology, University of Puerto Rico, Mayaguez, Puerto Rico. Contains, among others, these reprints:

"Sediment-Producing Fishes," by John E. Randall, 2 pp., illus. (From Underwater Naturalist, vol. II, no. 1, Winter 1963/64, pp. 30-32.)

"Contributions to the Biology of the Queen Conch, STROMBUS GIGAS," by John E. Randall, 53 pp., illus. (From Bulletin of Marine Science of the Gulf and Caribbean, vol. 14, no. 2, June 1964, pp. 246-295.)



These publications are not available from the Fish and Wildlife Service, but usually may be obtained from the organization issuing them.

"A Revision of the Filefish Genera AMANSES and CANTHERHINES," by John E. Randall, 30 pp., illus. (From Copeia, no. 2, June 30, 1964, pp. 331-361.)

"Effects of Hurricane Edith on Marine Life in La Parguera, Puerto Rico," by Peter W. Glynn, Luis R. Almodovar, and Juan G. González, 10 pp., illus. (From Caribbean Journal of Science, vol. 2, nos. 2 & 3, June & Sept. 1964, pp. 335-345.)

"Notes on the Biology of the Echinoid *Diodema Antillarum*," by John E. Randall, Robert E. Schroeder and Walter A. Starck, 12 pp., illus. (From Caribbean Journal of Science, vol. 4, nos. 2 & 3, June & Sept. 1964, pp. 421-433.)

"A New Caribbean Muricid Mollusk, *TYPHIS PUERTORICENSIS*," by Germaine L. Warmke, 4 pp., illus. (From The Nautilus, vol. 78, no. 1, July 1964, pp. 1-3.)

"Notes on the Groupers of Tahiti, with Description of a New Serranid Fish Genus," by John E. Randall, 15 pp., illus. (From Pacific Science, vol. XVIII, no. 3, July 1964, pp. 281-296.)

Taxonomia, Ecología y Valor Nutricional de las Algas Marinas de Puerto Rico: Algas Productoras de Agar (Classification, Ecology, and Nutritional Value of Marine Algae of Puerto Rico: Agar-producing Algae), by Manuel Díaz-Piñero and Celeste Caballer de Pérez, 155 pp., illus., printed in Spanish. College of Agriculture, University of Puerto Rico, Mayaguez, Puerto Rico.

"A Study of the Growth and Other Aspects of the Biology of the West Indian Topshell, *CITTARIUM PICA* (Linnaeus)," by Helen A. Randall, 18 pp., illus. (From Bulletin of Marine Science of the Gulf and Caribbean, vol. 14, no. 3, Sept. 1964, pp. 424-443.)

"Embryological Development of the Syllid, *Autolytus Fasciatus* (Bosc) (Class Polychaeta)," by M. Jean Allen, 18 pp., illus. (From Biological Bulletin, vol. 127, no. 2, Oct. 1964, pp. 187-205.)

"*Musculus pygmaeus* spec. nov., a Minute Mytilid from the High Intertidal Zone

at Monterey Bay, California," by Peter W. Glynn, 9 pp., illus. (From The Veliger, vol. 7, no. 2, Oct. 1, 1964, pp. 121-128.)

"El Instituto de Biología Marina" (The Institute of Marine Biology), by John E. Randall and Juan Gerardo Gonzalez, 8 pp., illus., in Spanish. (From Agricultura de Puerto Rico, vol. 50, no. 1, Jan.-June 1963, pp. 31-39.)

"La Productividad del Mar" (Products from the Sea), by Juan A. Rivero, 14 pp., illus., in Spanish. (From Agricultura de Puerto Rico, vol. 50, no. 1, Jan.-June 1963, pp. 4-18.)

#### SALMON:

Underwater Guideposts: Homing of Salmon, by Arthur D. Hasler, 167 pp., illus., printed, \$6.00. The University of Wisconsin Press, 114 North Murray St., Madison, Wis. 53715. A chronological account of studies of fish migration, in the stream phase and open water phase, and particularly the migration of Pacific salmon. Author's theories concerning the use of odor by salmon to locate parent streams during freshwater phases of salmon migration. Interesting chapter on "Sun-Compass Orientation" theorizes that salmon is capable of taking bearings from sun and compensating for inconstant rate of azimuthal change; it must know at what rate to compensate in order to maintain constant compass direction. It seems incredible that a fish is able innately to accomplish something for which men require instruments, charts, etc., but experimental observations reveal that this does occur and is strong evidence of a "biological clock." Contains bibliography of 119 references and a 3-page index.

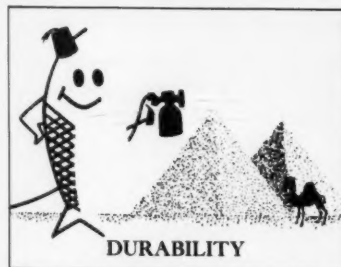
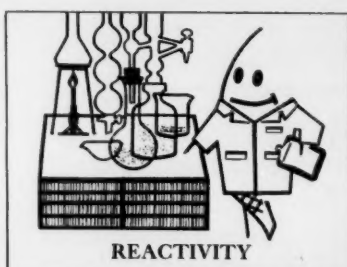
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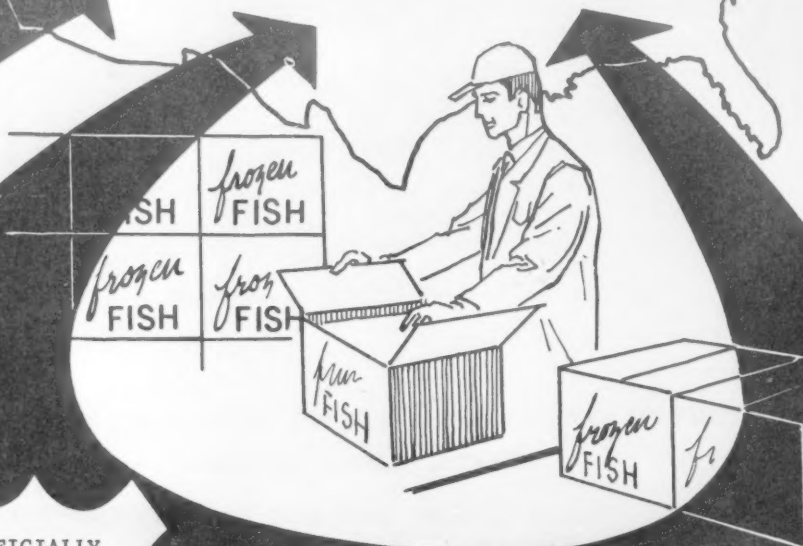
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